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SPONTANEOUS COMBUSTION OF COAL.

NO doubt, owing to the number of vessels which have during the recent past had bunker or coal cargo fires, the committee of Lloyd's Register of British and Foreign Shipping have thought it necessary to investigate the subject again, from the point of view of lessening their frequency. In consequence of this decision, the matter has been dealt with by the Chief Engineer Surveyor and his staff, and a very interesting and comprehensive report has been prepared on the subject and presented to the committee. This report sets out that in 1911 there were no less than 103 cases of bunker fires and twenty-four cases of coal cargoes on fire. Of the bunker fires, seventy-six were classed in the Society's Register, and twenty-seven were in unclassed or disclassed vessels. The details of the report show that spontaneous heating is more likely to occur in cross bunkers than in side bunkers.

It is further noticed that very few of the vessels in which casualties occurred were new, their average age being over nine years and a half, so that in the majority of cases the causes of the casualties must be other than defective arrangements of bunkers, which, if they existed, would have been detected and remedied long before the dates of the actual fires. The Report of the Royal Commission of 1875 on the Spontaneous Combustion of Coal in Ships is summarised and its conclusions are dealt with in the light of later experience, and similar treatment has been applied to the investigation which was held in 1900, at Cardiff, as to the casualty to the sailing ship, *Walter H. Wilson*. In the proceedings of the latter case reference was extensively made to an exhaustive treatise by M. Henri Fayol, the Engineer Director of the Collieries of Commentry and Montvicq, upon "The Alteration and Spontaneous Combustion of Coal exposed to the Air," published in 1879. Our space is too limited to give the arguments of the Chief Engineer Surveyor in detail, but we can say that the subject has been treated in a most logical and comprehensive manner, and the conclusions set out hereafter are based on the material available to date. These general conclusions set out that thorough ventilation of the coal in bulk is impractical, but that, while the surface ventilation, as carried on at present, may be a safeguard against the accumulation above the coal of marsh and other inflammable gas evolved from the coal and a consequent explosion, it is a question whether this ventilation, supplemented as it frequently is by the opening of the hatches in fine weather, does not aid in producing heating of coal, and the risk of spontaneous combustion, by supplying to the body of the coal the limited quantity of air necessary to prevent the slow absorption of oxygen, which is now shown to be the cause of the heating of the coal.

The theory that the presence of pyrites has a prejudicial effect, as found by the Commissioners in 1875, is clearly negatived, and it is apparent from the authorities cited that wet or damp coal is not in any way more dangerous to carry than coal which is perfectly dry. The most desirable course would be that suggested by M. Fayol, *viz.*, to hermetically seal the holds and arrange for the escape of the marsh gas evolved during the voyage, especial care being exercised to set up thorough ventilation before discharging cargo and to prevent the leakage of dangerous gas through sounding pipes and pump suction pipes. This is nothing more than is habitually done when carrying petroleum in bulk, and no difficulty should therefore be experienced. As the conditions applying to bunkers are so diverse from those applying to holds, the following points are set out in an emphatic manner and cannot fail to impress the engineer concerned as to their bearing and importance :—

That the thorough ventilation of the bunkers should be effected before entering them with a naked light. That heating of coal and the consequent risk of spontaneous combustion does not proceed from the presence of gas, but is caused by the absorption of oxygen from the air. That this absorption, and the accompanying development of heat, is greater at high than at low temperatures, so that when once commenced it proceeds at an increasing rate if the supply of air is maintained. That where heat is being generated by the absorption of oxygen it is probable that more gas will be evolved. The evolution of the gas, however, does not cause the generation of heat. Where such gas is being evolved, if sufficient supply of air is maintained to provide more oxygen than is being absorbed, an explosive mixture is formed amongst the coal. To minimise the absorption of oxygen by the coal in reserve bunkers, or in any bunker in which men are not actually working, the lower doors should be kept absolutely closed, so as to prevent any current of air whatever passing through the bunker and into the mass of coals. If there are any parts of bunkers in which, owing to the proximity of boilers, uptakes, or recesses through which steam pipes, etc., are carried, there is likely to be a higher than normal temperature, these parts should, if possible, be stowed with large coal and should be worked out as soon as possible. The shoots should be arranged not to deliver small coal into these places. Small coal which accumulates under shoots, etc., should be worked out as soon as possible and not left to the last. If any coal is left in a bunker when a fresh charge has to be taken in, it should be trimmed into a position to ensure its being used on

the next voyage. It cannot be too strongly impressed upon those responsible, that danger of overheating and spontaneous combustion increases with the length of time the coal remains in the ship. Where bunkers are over gutterways, etc., special care should be taken that the limbers are tight. Several fires have originated in bunkers just over the limbers, and there is reason to suppose that they have been caused by air circulating through the coal and coming from the limbers. There is no risk entailed by the coal being wet when put on board. In fact, in cases where coal is known to be of a fiery nature, it would be an advantage for the small coal to be damped when charging the bunkers. If heating of any part should occur where there is no traceable external source of heat to account for it, the heating will probably be local only in a part where the coal is small, and the surrounding portions may not be overheated. In attempting to obtain access to the heated parts for the purpose of applying water, special care is needed to prevent the action taken from supplying the air which is needed to convert a heated zone into an actual fire. Although some kinds of coal have proved to be more liable to spontaneous heating and combustion than others, it should be realized that *all* coal, even anthracite, is liable to these occurrences.

OIL FUEL.

THERE is no doubt that the observations made by Sir Marcus Samuel during the recent discussion on the comparison of the Diesel oil engine, Geared turbine and Suction gas engine, with the Reciprocating steam engine at the meeting of the North-East Coast Institution of Engineers and Shipbuilders, had for their purpose the promotion of a feeling of confidence, that the price of oil which at present obtains is a safe factor upon which to base calculations for the future, and, naturally, having regard to the very large interest that Sir Marcus has in the oil trade, it is not surprising that he takes the particular point of view indicated in his speech.

On the general question of the power value of fuel per unit of weight, he is satisfied that with a four-cycle engine one ton of oil will perform the work of four tons of coal, and that the present price of oil thus shows a considerable saving to the ship owner, but who is to know, whether in the near future, the price of oil all over the world may not be increased by a 100% or more, in the same manner in which the price of petrol has been increased 50% in three months, as far as consumers in the United Kingdom are concerned, and this, in the face of an ever-increasing consumption?

If such an increase were actually made, the effect would be of a very much more far-reaching character than that which obtains in the matter of a fuel used to such a large extent for pleasure purposes, and we think that in view of the recent experiences in the petrol market, those interested in oil fuel will walk very warily until there appears to be no reasonable doubt that the cost of oil fuel will not be rushed up to an abnormal price owing to commercial operations that are difficult to combat. If this did happen the effect produced appears to us to be just the opposite to that which the interests of the Oil Companies would demand. Surely it is a very wise commercial policy to encourage as far as possible the scientific development of appliances for motive power to the greatest possible extent by conservative methods, and not to quash such development by commercial operations having a prohibitive effect.

"TITANIC" ENGINEERING STAFF MEMORIAL.

THE enthusiasm which has been evinced in Liverpool in connection with the proposed monument to be erected in honour of the engineering staff of the *Titanic* is very gratifying to all engineers. The interest in the memorial extends considerably beyond an engineering circle, and it is quite apparent that the public mind has been opened to the fact that the engineering staff individually and collectively carry a burden of responsible work hitherto not realized even by the average passenger, who may be expected to look below and try to weigh the balance of power and its distribution, occasionally, in the course of his voyaging. Marine engineers as a rule are not given to proclaim themselves; their work and their duties keep them closely occupied. Year by year these duties have been increased with added responsibility, which demands close attention to study and discussion among themselves to elucidate doubtful points, and it is only on an occasion such as this that their value and steady application to duty are brought into public light, with the resulting wide-spread desire to render the honour of distinction to the memory of Mr. Bell, the chief engineer, and his staff. The instance of the *Titanic* is by no means the first where the engineers held on to the post of duty to the last and went down with their ship, although others were saved, but it is the greatness of the recent loss which has stirred the hearts of so many to subscribe. It appears to some of our readers very desirable that the various amounts which are being collected with the same object in view—of rendering honour to the memory of the engineers—should be merged into one fund and administered by a joint committee, keeping in view the different proposals which have been made public, memorials in London, Liverpool and Southampton, with besides a substantial amount invested to provide memorial votes each coming year for orphans of marine engineers.

We are informed that the *Titanic* Engineering Staff Memorial Fund now amounts to the following:—

Institute of Marine Engineers, London, up to 27th July	£1,570	0	0
Southampton Committee, up to 24th July	551	7	7
Liverpool Committee, up to 24th July, exclusive of numerous returns yet to come in, over	2,800	0	0
Total	£4,921	7	7

(A general memorial fund is being raised in Belfast, which at present amounts to £2,450).

DAVID NAPIER, ENGINEER.

IN this volume, well printed and bound as are all the works emanating from this well-known Glasgow publishing firm, we have an authoritative and excellently planned account of the work and worth of one of the most notable enterprising and skilful pioneers of steam navigation during the earlier period of its history in Europe. Interest is largely centred in the autobiographical account—all too brief—throughout which and the introduction, but more particularly the notes and appendix by which these are supplemented, there is wealth of material relating not only to the subject of the memoir but also to many famous shipbuilders, engineers and shipowners who lived and laboured in the first half of the nineteenth century, and to many vessels representative of the main stages of development in steam navigation during the period from the *Comet* of 1812 to the *Great Eastern* of 1857. The volume, which is enriched by many illustrations of early steamboats and engines, as well as reproductions of historic documents, has been edited by Mr. David Dehane Napier, a grandson of David Napier. The autobiographical sketch is, of course, reproduced in the words of Napier himself, but with greater fulness and admirable clearness and consistency facts are given regarding the subject of the memoir and the early general history of steam navigation by Mr. David Bell, Glasgow, who was long a partner in the shipbuilding firm of Messrs. Napier, Shanks & Bell, Yoker. This gentleman is responsible for a large number of "notes" of great value bearing on contemporary workers and their productions. The autobiography in which David Napier tells the story of his life, modestly but interestingly, only occupies a small portion of the volume—14 pages out of 126—but with this as a basis Mr. Bell in his notes skilfully elucidates quite a number of points of first importance in the story of steam navigation. He brings out very forcibly the very large share the Napier family—David and his even more renowned cousin Robert particularly—had in bringing about the transition from sail to steam as the prime motive power in ships. In the space at our disposal here it is not possible to give an account of the leading facts and events of Napier's life and work save in the briefest outline. In the course of the article appearing in this issue on "The Centenary of the British Steamship," his notable share in pioneer work is also treated of. Briefly: David Napier was born at Dumbarton in 1790; went to the public school there at the age of five and removed to Glasgow at the age of twelve, his father John Napier, having then decided that his business as iron founder, smith, and light engineer was to be more profitably conducted further up the Clyde. At Dumbarton John Napier used two steam engines in his business, one of them mainly for boring cannons which were cast at Carron Ironworks. David, who seems to have begun assisting his father soon after attaining his twelfth year, "never served a regular apprenticeship to anything," as he says in the brief autobiography, but put his hand to everything, and by the time he was twenty he had complete charge and control of his father's business. Shortly afterwards his father died and David married. He had fifteen of a family; six sons and nine daughters. His connection with Henry Bell, of *Comet* fame, came about through the latter's visits to his father's foundry in Howard Street, Glasgow, in quest of castings required for buildings he was superintending. About 1811-12 Bell had arranged with John Wood, of Port Glasgow, for the building of the *Comet*, and with John Robertson, of Glasgow, to fit into the vessel an engine which had been intended for another purpose. Robertson not being able to make the necessary boiler, Napier undertook to do so, as well as supply a number of castings. Referring to this in his autobiography Napier modestly says:—"I made the boiler and castings for the engine of Mr. Bell's little steamer the *Comet* for which he gave me his promissory note, payable at three months, which is still in my possession, never having been paid." Seeing steam navigation was likely to succeed Napier erected new works at Camlachie in the east of Glasgow for the purpose of making steam engines, and here the first engines made were for the *Dumbarton Castle*, the first steamer that went up Loch Fyne, and for the *Britannia*, the first that went to Campbeltown. Without going into the chain of circumstances which led to it, Napier in 1818 had a vessel built at Dumbarton by William Denny, into which he fitted the engines, and on his own account ran the vessel between Glasgow and Dublin, and afterwards between Glasgow and Belfast. This was the epoch-marking *Rob Roy*, the first vessel to thoroughly establish the practicability of navigating the open sea by steam, and, in its way, quite as memorable as the *Comet*. Steamboats built and engined by Napier were soon placed on service by him between Greenock and Liverpool, and Holyhead and Howth. Of David Napier it has been said that "with the year 1818 the steamboat industry received a fresh impetus from the energetic genius of one man who, during the next twenty-two years, did more for its extension and perfection than any other individual." Into his life of seventy-nine years—he died in London in 1869—there was crowded more of scientific investigation, practical experiment and the construction of new types of vessels and engines than might have sufficed for half a dozen men. At his Camlachie works he made experiments with models in a mill dam which upset many of the cherished theories, as to ship-form and fluid-resistance, of the naval architects of the time, and laid the foundation of the scientific experimental tank work of the present day. Based on results thus obtained, he freely gave advice for the building of hulls by others, and himself built the engines for many of the early Clyde steamers, and also for many vessels which navigated open waters; he built and operated steamers for Loch Lomond and Loch Eck; he ran a steam road carriage from Holy Loch to Loch Eck long before there were any public railways in either Scotland or England, carrying passengers by steam; he founded the engineering business at Lancefield in Glasgow, afterwards made famous by Robert Napier; he started the shipyard at Millwall on the Thames, a portion of which was utilized in conjunction with part of a neighbouring yard in the construction of the *Great Eastern*. Here, and latterly assisted by two of his sons, he built and engined vessels which repeatedly broke all speed records. In his brief autobiography Napier says:—"It would be endless enunciating the various alterations I was daily making in the engines and machinery of steamers. . . . It would be equally tiresome and uninteresting to enter into details connected with the various patents I obtained." To all present-day students of the progress of marine engineering who are so often baffled by traditionary discrepancies as to facts and dates such an enunciation first-hand from one of the principal actors would have been invaluable. In several chapters of the book the writer supplies, from authentic sources and with well-informed discrimination, much information regarding David Napier's life and work not contained in the autobiography, while in a lengthy introductory chapter and in numerous "notes" he deals with men, ships and subjects mentioned in, or arising out of, the autobiography, and in such a way as to clear up many of the errors and misstatements, which having crept into early histories have been perpetuated by writer after writer till now. This valuable work should be included in the library of everyone for whom accuracy in the story of marine engineering counts for as much as—if not more than—romance; although both of these eminently distinguish the contents.

* David Napier, Engineer, 1790-1869. An Autobiographical Sketch with Notes, 4to, with many Illustrations. Glasgow: James MacLehose & Sons 10s. nett.

MESSRS. WAILES, DOVE & CO., LTD.—Mr. W. H. Dick, who joined the board of directors of Messrs. Wailes, Dove and Co., Ltd., Newcastle-on-Tyne, at the end of last year, has now been appointed a manager at their head office. Mr. Dick is son-in-law of Mr. E. J. Dove, the managing director, and has for many years been a departmental manager with Messrs. Holzapfels, Ltd. Messrs. Wailes, Dove & Co.'s business has largely developed during the past few years, both at home and abroad, their most recent achievement (entrusted to their American house) being an extensive contract, the largest in the world ever placed for this class of work, *viz.*, for the coating of forty-six pairs of lock gates in the Panama Canal, involving over three million feet of surface. The firm have also just secured a large order from Messrs. John Brown and Co., Ltd., Clydebank, for the Royal Mail steamer *Aquitania*, now being built for the Cunard Line.

BRITISH STEAMSHIP CENTENARY.

The "Comet" and her Creators.

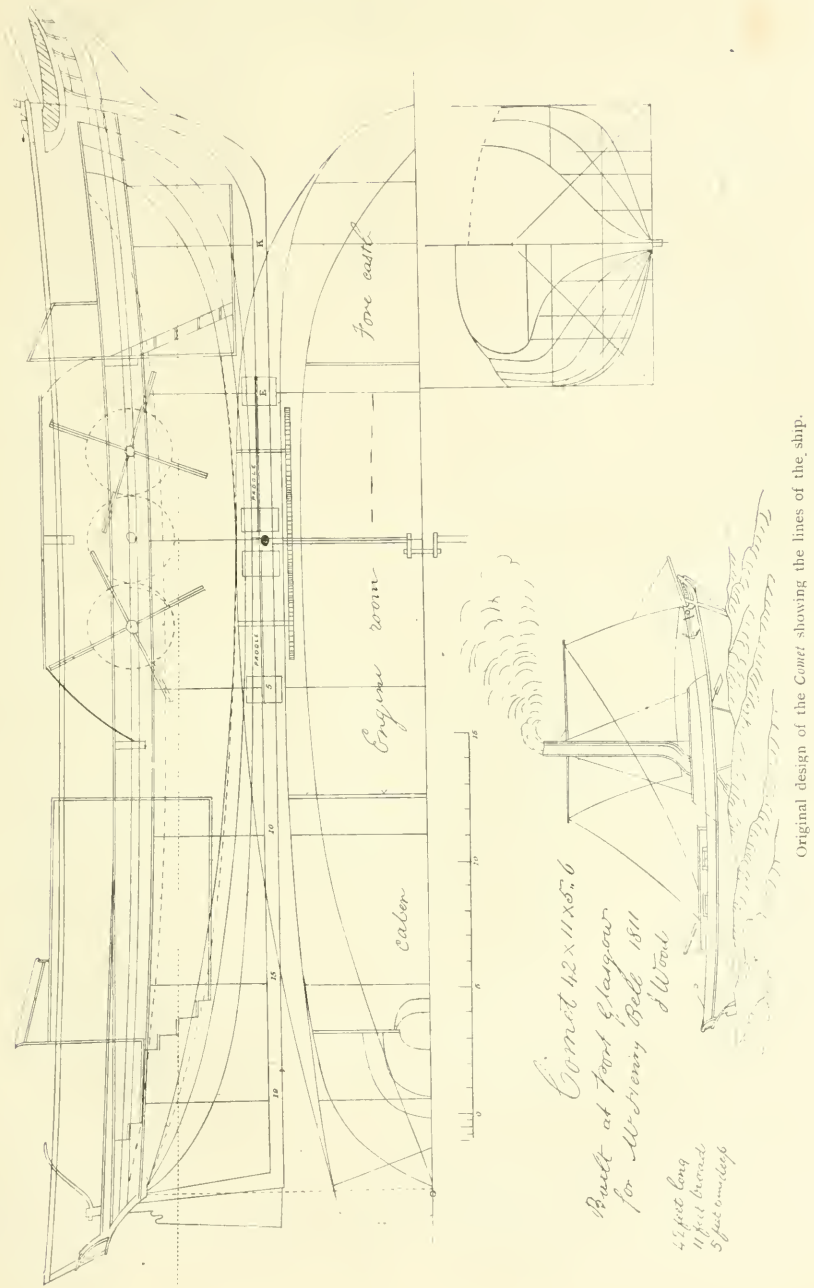
Under the title "British Steamship Centenary" in last issue some general particulars were given of the manner in which the Corporation of Glasgow, the Clyde Trustees and the municipal authorities of Greenock, Port Glasgow and other riverian townships are about to celebrate the centenary of the building, the launch and the putting into steady service of Henry Bell's steamboat *Comet* in the arena of passenger traffic on the Clyde. An exhibition of relics, documents, models etc., referring to times prior to Bell's day and success, and extending beyond his day down through all the steps of development to the present time, is to be opened in the palatial Art Galleries and Museum at Kelvingrove; a grand processional display of shipping of all kinds is to be held on the river on August 31st (Glasgow Trades' Holiday), which will embrace warships of various types and classes sent by the Admiralty; decorations are to be the order of the day on and by the river, special distinction being given to the frontage of the shipyard at Port Glasgow (now occupied by Messrs. Robert Duncan & Co.), where the *Comet* was built in 1811-12 by Messrs. John Wood & Co. On August 30th, a banquet is to take place in the Glasgow Municipal Buildings, George Square, when an eulogium on Henry Bell will be delivered by Mr. J. McKinnon Wood, M.P., before an audience thoroughly representative of industrial Clydeside.

Celebrations on the scale above indicated may appear to some uncalled for, or somewhat belated, seeing that the practically successful steamboat was an accomplished fact in British waters—albeit canal waters—ten years prior to the *Comet*'s advent, although William Symington's *Charlotte Dundas*, of 1802, was not commercially nor permanently successful. In American waters, Fulton's *Claremont*, of 1807, had demonstrated the entire practicability, and the commercial possibility, of steam navigation, and the commemorative *fêtes* in the States of three years ago was on these grounds quite justified. America's jubilancy was really due, not so much to any claim that the *Claremont* was absolutely the first practically successful steamer, and that she was the unaided production of an American citizen (Fulton's great indebtedness to Symington and Bell, not to mention Boulton and Watt, who supplied the engines, was too much matter of history for that), but that she was the "first practically successful steamer which permanently plied and was commercially successful." This is also the *raison d'être* of the forthcoming celebrations on the Clyde, *viz.*, to signalize the inauguration by the *Comet* of commercial steam navigation in Europe, and practically over the whole world, seeing that steamship building on the Clyde was, from that time onwards, vigorously and steadily pursued, not only for local, but for widespread enterprise.

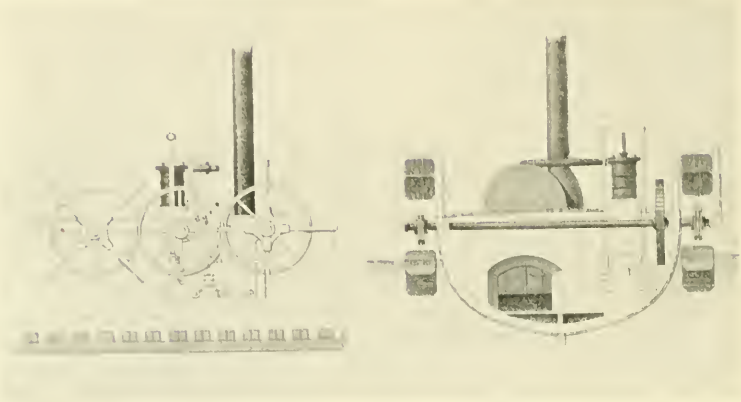
Whilst the Clyde undoubtedly is the birth place of modern commercial steam navigation in the Old World, other parts of Scotland, and other pioneers than Bell—and those who directly aided him—must always be thought of in connection with any movement commemorative of the great innovation which revolutionized the commerce of the world, and laid the foundations of the grand structure of modern civilization. Patrick Miller, William Symington, James Taylor—the great James Watt, of course—and Dalswinton Loch, Carron Iron Works and the Forth and Clyde Canal; all these are names and places which impel themselves into cognizance in this connection. To this aspect of the subject it is not possible—nor is it necessary—to devote any lengthened attention at this time. Readers may be referred to the article "Pioneer Work in Steam Navigation," with illustrations, in the issue of this journal for March this year. It is not our intention either to recapitulate—at least in all its sequence of detail—the well-known story of Henry Bell's early strivings to secure attention and assistance in his "wild ideas"; how my Lords of the Admiralty, twice appealed to, refused to see any value in his proposals; and how James Watt himself wrote discouragingly, if not contemptuously, of his ability "to bring the power of steam in navigation to a successful issue." Uneducated though Bell was, scholastically, he had the superior prescience, or the tenacious enterprise, which enabled him, of all the pioneers and founders of steam navigation, to most thoroughly grasp its vast possibilities and the greatness of its future, as is fully evinced by his importunate correspondence with our own and other Governments. His contemporaries seem mostly to have regarded steam navigation as only useful on inland waters, but in 1812, when the *Comet* had been running for a time, Bell, in a sort of prophetic outburst, is reported to have boldly asserted that "wherever there is a river of 4 ft. depth of water throughout the world there will speedily be a steamboat. They will go over the seas to Egypt, to India, to China, to America, to Canada Australia, everywhere; and they will never be forgotten among the nations."

While Bell, from this point of view, is fully entitled to the high place of honour into which he has been set, and deserves

The *Comet*, 1812.



Original design of the *Comet* showing the lines of the ship.



Comet's Engines (from Woodcroft's "Origin and Progress of Steam Navigation")

to a great extent the encomiums which have, and will at this time more than ever, be passed upon him, his name all along has been too readily taken as covering everything connected with the inauguration of commercial steam navigation in Europe. That he benefited immensely from what had been done by preceding pioneers, Miller and Symington especially, will readily be acknowledged, although even this apparently is apt to be overlooked. More so is this true, however, of a number of contemporaries—nay, coadjutors—from whom he received aid and guidance in matters of science and engineering practice quite beyond him, as well as of financial assistance quite as essential, yet some of whose names have scarcely figured at all in the history of the *Comet* and her successors. On the part of too many writers it has sufficed to state that "the *Comet* was built by Henry Bell in 1812." Such loose and off-hand chronicling, though not intended to mislead, has certainly contributed to the obscuring of others whose work in connection with the production of the *Comet*—not to speak of steamers preceding her—is no whit less memorable than Bell's, and at this time especially should receive due measure of appreciation. It is to be hoped that one effect of the exhibition being organized will be to draw more pointed attention to such matters, and that the accumulation of relics, documents, models and information generally will help materially to the sifting of evidence as to conflicting claims, and establish the various pioneer workers in their due and appropriate niches in the Temple of Fame.

Certainly there is much still to be done towards the explication and reconciling of existing discrepancies as to dates and facts in the history of early steam navigation, one instance of this being nothing less than the date of the actual launch of the *Comet* herself. Some writers have given January 18th, 1812, as the date on which the little vessel made her first trip to Glasgow, and on the strength of the evidence in favour of this date as that of her *launch* a leading shipping journal issued on January 18th last a very full and admirably illustrated Centenary Souvenir Number. In Mackenzie's "Reminiscences of Glasgow and the West of Scotland" (1866), reference is made to a ticket in the author's possession for a passage in the steamboat *Comet* bearing the date 1811, while in Williamson's well-known work, "Memorials of James Watt" (1865), the launch of the *Comet* is stated to have taken place in June, 1812. In an official Government blue-book published in 1822, there is included a report by John Wood and Co., shipbuilders, Port Glasgow, on the work done by them up to that year. One of the vessels which they return as having been built in their yard is the *Comet*, after the name of which the following particulars are given:—Length, 43 ft. 6 in.; breadth, 11 ft. 6 in.; measurement, 25 tons; horse-power, 4; launched July 24th, 1812. This, we would think, is sufficiently conclusive, but it can be corroborated by other extracts from sources at least equally authoritative with those in which other dates are given, including a statement regarding the date of the launch made by Captain William Mackenzie, who superintended the construction of the vessel and was her first commander. Founding upon these facts the *Glasgow Herald* announced the publication on July 24th—"the 100th anniversary of the launch of the *Comet* at Port Glasgow on July 24th, 1812"—of an illustrated supplement giving authentic details concerning the first steamship on the Clyde, with an estimate of the *Comet's* place in the history of steam navigation. Much of the information, it is stated, has not previously been published, or has been published incorrectly.

As regards the engines of the *Comet*, also, there seems to exist a lot of misunderstanding in various ways, not so much concerning the type and power, but the actual makers. By some Bell himself is given the credit of having "made" the machinery, with assistance from blacksmiths and founders here and there. That he did tinker at both hull and machinery, when the vessel after some service was beached near his hostelry of "The Baths" at Helensburgh and lengthened by 20 ft., is well known. Whether at that time the original engines were removed from the vessel and new engines installed is uncertain, but only on this assumption is it possible to arrive at anything like an explanation of the diverse statements which have obtained currency as to the "makers of the *Comet's* engines." Although it is invariably stated in popular, and ordinarily authentic, accounts on the subject that the *Comet's* engine was made by John Robertson, of Glasgow, and the statement is supported indubitably by the well-known photograph of the engine, with Robertson alongside, as well as by the preservation of the actual engine in the South Kensington Museum, there are those who claim that "the *Comet's* engine" was made by the firm of Anderson and Campbell, of Greenock, or, according to others, by Thomas Hardy, Cartsdyke, Greenock. Anderson and Campbell, afterwards Anderson, Caird & Co., had premises which formed the nucleus, or formed part of the site, of the now well-known establishment of Messrs. Caird & Co., and amongst those who contend for the Greenock origin of the engine is Dr. Robert Caird, of the firm last named, whose opportunities for research, and ability to adjudicate, surely few will dispute. In sending a subscription recently to the secretary of a fund for raising a memorial to John Robertson in his native village of Neilston, Dr. Caird has made it plain that in doing so he does not relinquish the claim made for Anderson and Campbell as the makers of the engine.

On the assumption, as has been said, that new engines took the place of the original when the vessel was being lengthened and improved at Helensburgh, and that, as some maintain is the case, the engines were not recovered from the wreck of the vessel at Craignish in 1820, then both claims may be substantiated. The engine now in South Kensington is the engine originally made and fitted by Robertson, and the

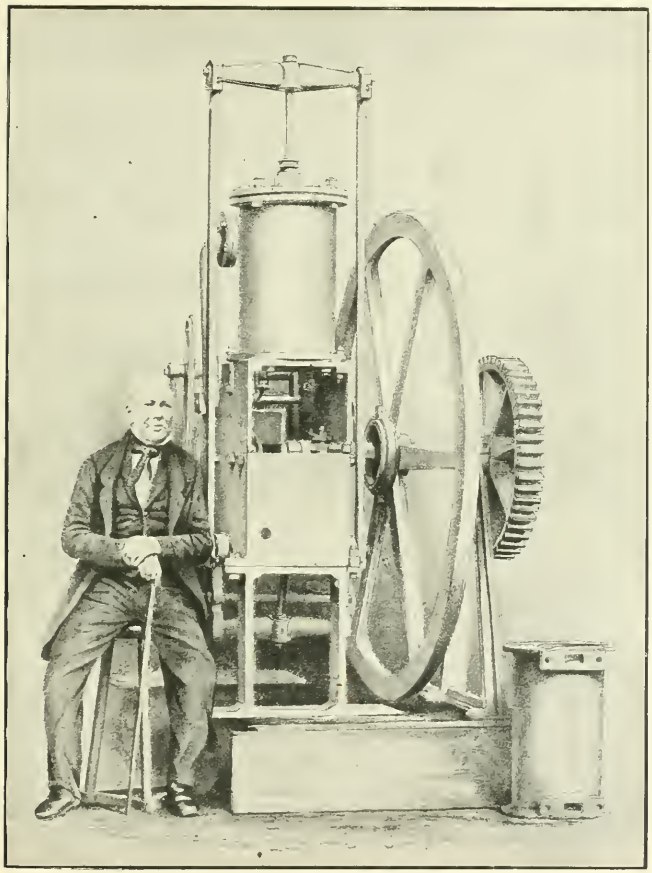
photo of it with Robertson alongside shows it complete, as it may have been taken from the vessel at Helensburgh, even to the original cylinder of 11¼ in. which was superseded by one of 12½ in. diameter and yielding four h.p. instead of three h.p. The odd cylinder is seen in the well-known photo referred to, but it was not sent to South Kensington. One chronicler has it that it was "long used by Mrs. Bell as a chimney for her greenhouse." In any case it was presented in 1876 to Glasgow Corporation, who have since given it more appropriate place in the Museum and Art Galleries, Kelvingrove.

Regarding the boiler of the *Comet* this was supplied by David Napier, cousin to the more renowned Robert Napier, who was then manager of his father's engineering business in Howard Street, Glasgow, and it is matter of history that payment for it was never fully received. David Napier has himself put it on record:—"I made the boiler and the castings for the engine of Mr. Bell's little steamer the *Comet*, for which he gave me his promissory note, payable at three months, which is still in my possession, never having been paid." It is worthy of note that this document is dated 12th February, 1814, a year and a half after the start of the *Comet*.

"I recollect that we had considerable difficulty with the boiler, not having been accustomed to make boilers with internal flues; we made them first of cast iron but finding that would not do we tried our hand with malleable iron and ultimately succeeded, with the aid of a liberal supply of horse dung, in getting the boiler filled." Beyond the information here given no particulars exist regarding the working or the ultimate destiny of the boiler, except that in 1841 Mr. J. Scott Russell stated that it was then in his possession.

Having now drawn attention to some of the points in the history of the initiation of commercial steam navigation on the Clyde, about which there still exists uncertainty, the way is clear for more connected treatment of the story of the *Comet's* being "brought into being"; and in this, as has been promised, effort will be made to touch only lightly the conventional or well-established features of the story and bring into prominence less known facts.

In a pamphlet written by Henry Bell himself—dated Helensburgh, 19th February, 1813—dedicated to Sir John Sinclair, Bart., and entitled "Observations on the Utility of applying Steam Engines to Vessels, etc.," interesting particulars are given as to the writer's investigations and experiments prior to proceeding with the *Comet*. "In the year 1809," he says, "I attempted to make a small model, in which I succeeded so far that I was convinced an engine could be made, on such a construction, so as to drive a vessel in all weathers. . . . But for further information before I attempted anything on a large scale, in the year 1810 I built a small boat 13 ft. long and 5 ft. beam, on which I tried a great many experiments, by erecting a number of different machines, and in the year 1811 I succeeded so far in my views that I was fully convinced a vessel of any size could be wrought by steam. . . . . Being thus satisfied, in the year 1812 I built a vessel 40 ft. long and 10½ ft. beam, and hold 8 ft. deep, which I fitted up solely for passengers in the following manner.. . . This vessel has been running between Glasgow and Greenock for six months past, and is found very commodious for passengers. The distance between Glasgow and Greenock by water is about 26 miles, which she runs (in ordinary weather) with ease in four hours and a half. The engine is a small portable one of only three horse-power; a vessel of her size would require an engine of five horse-power, by which she could run the same distance in three and a half hours. . . . The above vessel is the first that has ever answered the purpose, the engine of which is so constructed that no change of position can have any effect upon it. It goes as well when the vessel is tossed with a heavy gale as in a calm. This has been experienced; for the *Comet* (which is the name of the above vessel) has run between the island of Bute and Greenock in very stormy weather, with high seas, which is known to be a more dangerous passage than out in the open ocean." The writer then proceeds to enforce, by arguments which now-a-days may seem puerile, the utility of the steam engine, not only for vessels of all kinds—mentioning dredgers and ice-breakers—but for carriages on roads and rails. Here again is seen the enlightened and far-seeing view Bell took of the future in store for steam transport on sea and on land.

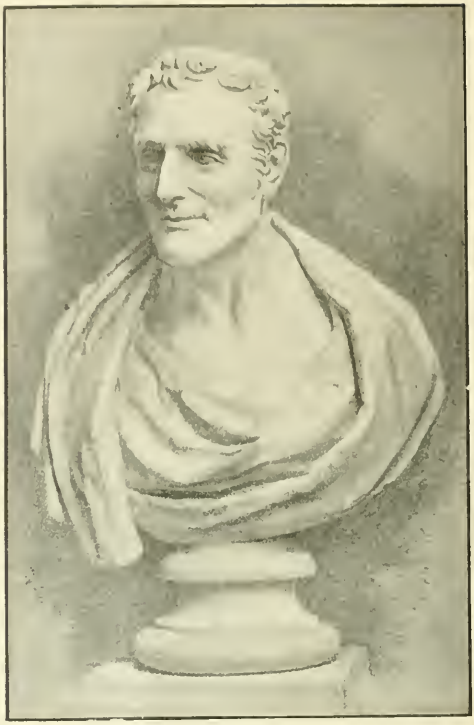


Original Engine of the *Comet* with John Robertson, its maker, alongside.

Bell's "Observations," however take no cognizance of others who were associated with him in producing the *Comet*, John Wood who designed and built the hull, John Robertson who supplied and fitted the engine, David Napier who made not only the boiler, but various accessories in the way of castings for the engines (which Robertson could not undertake), and whose initial difficulties and experiments with the boiler have been noted. In the series of experiments with an open boat in 1809 to 10 to which Bell refers, he was assisted by Mr. John Thomson, an engineer of Tradeston, Glasgow, efforts being mainly at first directed to devising and fitting wheels and gearing for propulsion by hand power. The trials only proved (as Miller at an earlier date had amply proved) that manual power was quite inadequate for effective propulsion. The question of applying steam power was then discussed between them, and Thomson understood that he was to be associated with Bell in the construction of the steamboat which was then contemplated, and for which Thomson had made out sketches of machinery, boiler, etc. Much to Thomson's surprise and disappointment, he discovered, when this stage had been reached, and while the sketches were in Bell's hands, that the latter had entered into arrangements with John Robertson to fit up an engine, which he had already built for another purpose, on board a vessel then underway for Bell at Port Glasgow. Finding himself thus left out of the business, after all his trouble in assisting Bell and furthering his ambitious projects, Thomson resolved to have a steamer built on his own account. He approached John Wood & Co., and a hull was commenced by them while Bell's *Comet* was still on the stocks. This was the *Elizabeth*, a vessel 58 ft. long by 12 ft. beam, fitted with engines of 8-10 horse-power, made according to some by Thomson himself, but more probably by James Cook, of Tradeston, who soon became distinguished for the number of marine engines produced. The *Elizabeth* was launched in November, 1812, and commenced to ply on the river on March 9th, 1813; that is seven months after the start of the *Comet*; her speed being nine as against the *Comet's* five or six miles. In 1813, while still smarting under the disappointment of Bell's defection, Thomson published a pamphlet in which all the circumstances are fully detailed.

Arrangements for the building of Bell's *Comet* were entered into with Mr. John Wood, senior, Port Glasgow, and her keel was laid down in October, 1811. The demise of Mr. Wood occurred while the vessel was still on the stocks, and she was brought to the launching stage by John Wood, junior, who, with his brother Charles, subsequently carried on the business and attained to high renown as shipbuilders. Of the brothers Wood—John and Charles—an appreciation has been put on record by no less a personage and professional authority than John Scott Russell, the builder of the *Great Eastern*, who knew both men intimately. Speaking before the Institution of Naval Architects in March, 1861, he declared that "as naval architects and as practical shipbuilders, I think I may say that they led for many years the march of improvement in steam navigation. Their ships were long the patterns which the builders around them were proud to follow."

Henry Bell's Monument in Row Parish Churchyard.



Bust of Henry Bell.

Little general notice seems to have been directed to the building of the *Comet* while this was under progress, and even the launch, as has been shown, seems to have been considered quite unimportant as an item of news and was unrecorded. It was very probable that Bell said as little as possible of the venture at the time, and the Woods probably regarded the little vessel as a piece of shipbuilding work not worth boasting about. In the drawing of the original design of the *Comet* reproduced herewith, which is a facsimile of one presented by John Wood to Robert Napier in 1831, the length given is 42 ft., breadth 11 ft., and depth 5 ft. 6 in. In the original working drawing, on half-inch scale, which was presented by John Wood to a personal friend, and is now in the possession of Mr. Matthew Blackwood, Ardmore, Port Glasgow, the dimensions given by scale measurement are:—Length overall from stem head to taff-rail, 50 ft. on deck; from inner side of stem to after side of stern post, 42 ft. 8 in.; on keel, 40 ft. 3 in.; breadth over planking about 11 ft. 3 in.; depth moulded amidships from top of keel to gunwale, 5 ft. 8 in.; centre of paddle wheels, 6 ft. 9 in. apart. The leading feature in the design of the hull was the provision for four paddle wheels, two aside, an arrangement, however, which was soon altered to one wheel aside, experience showing that two wheels were far from efficient and interfered with the steering of the vessel. She had one tall funnel, which also acted the part of mast, carrying a large square sail when the wind was favourable.

Robertson's engine and Napier's boiler were taken from Glasgow to Port Glasgow by water, and installed on the *Comet* while on the stocks, and the launch—on July 24th, 1812, as the weight of evidence decides—was that of a complete steamer ready for service. As to the engine and arrangement of machinery generally, a few descriptive particulars will be of interest. Variously stated as of three and four horse-power (due probably to the subsequent substitution of a 12½-in. for the original 11¼-in. cylinder) the engine had a single upright cylinder 12¼ in. diameter and with a stroke of 16 in., placed above the crank shaft and driving a pair of side levers by means of two rods. The crank shaft, on which a heavy flywheel is fixed, was worked from the levers by a connecting rod, and the slide valve was driven by an eccentric on the main shaft through a rocking shaft. The condenser is placed between the side levers, the latter driving the vertical air pump. Steam was supplied by a low-pressure boiler set in brickwork and placed on one side of the engine. The machinery, as already stated, was not originally designed for marine purposes. Robertson was making it for land work, but Bell happened to visit his shop when it was nearly completed and at once purchased it for £165, afterwards arranging with David Napier for the boiler.

Of the *Comet* on service there are very few authoritative records, apart from what Bell himself has stated in the "Observations" from which quotations are given above. He gives the average time of the passage between Glasgow and Greenock—26 miles—as 4½ hours. It is recorded that on her trial run—August 6th, 1812—she steamed from Greenock to Port Glasgow—in all probability with the tide—in 3½ hours, beating in speed all the "fly boats" then on the route, which required from 10 to 12 hours for the passage. Not infrequently the runs were seriously interrupted by the *Comet* getting aground on sand banks on the river. On one occasion early in her career she grounded at Renfrew. Bell himself was on board, and in explaining the circumstances later he remarked that "the men just stepped over the side and pushed her across the shoal!" With all his foresight and unbounded belief in the future of steam navigation, Bell, in such circumstances could scarcely be expected to picture a time when vessels of nearly 30 ft. draught would freely pass up and down the stream, in which his little *Comet* was apt to ground, and steamers eighteen times as long as the *Comet*, five times as fast and of 2,000 times the tonnage, would cross the Atlantic in less than five days.

It has been the endeavour in this article to avoid traversing the oft-trodden ground of a sequent and detailed story of Bell and the *Comet*, and to emphasize less known, and perhaps debatable points of the subject. There is therefore no need to follow the career of the pioneer steamer further than to state that after about eight years' work, not only in river but in coasting service, both in the West and the East of Scotland, she was wrecked through being driven ashore by wind and tide at Craignish, Argyleshire, on December 15th, 1820. Bell himself was on board, and all were able to scramble on to the rocks and ashore. It is supposed that the hull had been weakened through being lengthened, but in any case it broke in two. The after body drifted out to sea, while the fore part, containing the engines, remained fast on the rocks

HENRY BELL.
(Reproduction of a painting by James Tannoch.)

The Memorial unveiled November 4th, 1911, at the birthplace of Henry Bell.

The words on the tablet are as follows :—Henry Bell, Pioneer of Steamship Navigation in Europe. Born in the Old Mill House, near this spot, 1767 A.D. Died at Helensburgh, 1830, A.D.

The man in the picture—Mr. Baird—a farmer in the neighbourhood, is a grand-nephew of Henry Bell. The unveiling ceremony was attended by, amongst other descendants and distant relatives, Mr. John Bishop Aucheneden, Blanefield, whose mother was a cousin of Henry Bell.

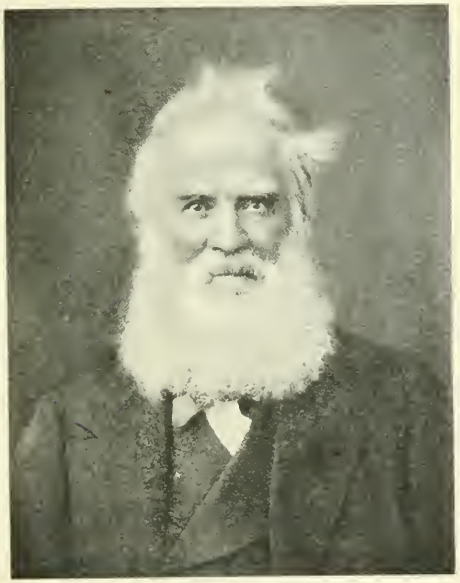
The hull could not be salved but, according to accepted accounts, the engine was recovered and was acquired by a Glasgow coachbuilding firm. After driving machinery there and in a brewery in Greenock for many years it was finally purchased by Robert Napier and was by that gentleman presented in 1862 to the South Kensington Museum.

With the success in service of the *Comet*, and especially of the *Elizabeth*, already referred to, the building of steamships on the Clyde was soon fairly inaugurated. The rapidity of production within the succeeding ten years was quite remarkable considering the diffidence that generally marked the adoption of mechanical innovations during the first twenty years of the nineteenth century. In 1813 four steamers had been built and in 1814 this number was doubled ; in 1815 six were added, in 1816 six more, and so on till 1822, when no fewer than forty-eight steamers had been finished on the banks of the Clyde. To enumerate these vessels by name would be tedious, but as a type of these early Clyde steamers, which usually had the deck projecting out over each side of the hull and tapering away from the paddle boxes, which were well forward—thus giving rise to the term of "cod's head and mackerel tail"—we reproduce a view of the *Industry* which was built in 1814 at Fairlie by the firm of Fife (subsequently so noted as yacht builders) and engined by Geo. Dobie, of Tradeston—re-engined by Messrs. Caird & Co., Greenock, about 1849. This worthy old specimen was at work up to 1862, but in that year she got into collision and met with serious injury to her hull and paddles. The boilers being done it was not thought worth while to repair her and she was subsequently presented to the Clyde Trust as a relic of bygone days. The hull was allowed to rot away in Bowling Harbour, but the engines, or what remained of them, were taken out and are now erected along with other such relics close to the Kelvingrove Museum, Glasgow.

The success of the *Comet* from an engineering point of view was such that, as has been stated in regard to the *Elizabeth*, larger, more powerful and better designed vessels were put into competition with her. Within a very short time of the starting of the *Comet* John Robertson also was the owner of four other steamboats—the *Oscar*, the *Defiance*, the *Clyde* and the *Marquis of Bute*—the engines of which he constructed. The little *Comet* was beaten in speed on her own river, and about 1816 she was taken through the Forth and Clyde Canal to the river Forth and for a time did service there. Rival steamboats, however, soon came upon the scene here also, and she was brought back to the Clyde, and in 1819 was put upon the West Highland route, proceeding through the Crinan Canal to Oban and Fort William. Within a little more than a year after her opening run she was wrecked off Craignish as already related. Bell at the time of the wreck was on his way back from the north-west coast, where he had been securing shareholders for the building of a larger and more powerful steamer. In 1821 this materialized in the building by Mr. James Lang at Dumbarton of *Comet II.*, Bell being the largest shareholder. She was a vessel of 94 tons burthen and had an engine of 25 h.p. and a copper boiler weighing 9 tons, supplied by D. McArthur & Co., of Camlachie. She was employed on the route between Glasgow and Inverness *via* the Crinan and Caledonian canals, but was sunk on October 21st, 1825, through collision with the steamboat *Ayr* off Kempoch Point, Gourock, about seventy of her ninety passengers being drowned. A year later, in July, 1826, she was raised, but was so severely damaged as to be beyond repairing. An engine, believed to be the one which propelled this vessel, is preserved alongside that of the *Industry* at Kelvingrove. Bell's fortune never recovered from the loss of *Comet II.*, and with her he passed out of the roll of those who owned or operated steamships.

Henry Bell reaped in his lifetime but poor reward for his great services ; in this respect, however, being no worse than many others who worthily shared in the introduction of steam navigation. Through agitation mostly, a government honorarium of £200 was obtained, and in Glasgow and its vicinity a public subscription was raised on his behalf to the extent of £500. The Clyde Trustees, recognising the immense benefits to Glasgow and the Clyde of his enterprise, conferred an annuity upon him of £50, later increased to £100, and after his death the annuity of £50 was continued to his widow. There are three memorials to him in the West of Scotland, and quite recently the inhabitants of Linlithgowshire erected and unveiled a memorial tablet at the place of his birth, Torphichen Mill, near Linlithgow. Over his remains and those of Mrs. Bell in the churchyard of Row, near Helensburgh, where his death took place in November, 1830, there is a recumbent statue of him, whose erection shortly after the interment was defrayed by Mr. Robert Napier, of Shandon—the renowned shipbuilder—and Dr. Thomas Paterson, Glasgow. On the esplanade at Helensburgh—of which town Bell was first provost—there is a handsome granite obelisk erected at the expense mainly of Sir James Colquhoun of Luss, and other gentlemen connected with Helensburgh. A massive obelisk, also erected some ten years after his death, occupies a conspicuous, picturesque and most fitting site at Dunglas, near Bowling, which arrests the attention of all who sail up or down the Clyde.

Whether or not full justice has yet been done to the work and memory of Henry Bell will clearly emerge from the celebrations and the exhibition being organized. There is, however, a strong disposition on the part of those connected with the engineering, shipbuilding and shipping industries of the Clyde to mark, in the creation of the *Comet* and the advancement of steam navigation, the part taken by John Robertson. As has been mentioned, a fund is being raised to erect a memorial over his grave in the Southern Necropolis in Glasgow or at his native village of Neilston, where at present there is a modest stone bearing the following inscription :—" To the memory of John Robertson, engineer, inventor and erector of the engine of the *Comet* in 1811, which first sailed the Clyde in 1812 and was the first vessel propelled by steam that regularly traded in Europe. Born in Neilston 10 Dec., 1782. Died in Glasgow 19 Nov., 1868. Aged 86."



DAVID NAPIER,
Who made the boiler and castings for the engine of the *Comet*.
(From a photo belonging to David Dehane Napier, Esq.)

JOHN WOOD,
Who contracted to build the hull of the *Comet*.
(From original, in possession of James Reid, Esq., Port Glasgow).

In bringing this article to a conclusion it may be fitting to refer to the fact that one item in the exhibition now being organized in the Art Galleries and Museum at Kelvingrove will be a model of the oil-engined vessel *Jutlandia*, just completed by Messrs. Barclay, Curle & Co. This vessel may be regarded as the *Comet* of to-day. By a striking and remarkable coincidence she inaugurates, on the Clyde at least, a new system of marine propulsion, in which steam is *non est* ; exactly 100 years after the original *Comet* opened the era of steam.

PUBLISHERS' ANNOUNCEMENT.—Our thirty-fifth annual volume commences with the present number. Volume 34, August, 1911, to July, 1912, comprising nearly 500 pages of highly interesting matter, will be ready shortly, and orders are now being taken for delivery of volumes at the following rates :—7/6 per vol. ; by post, securely packed, United Kingdom and Canada, 8/- ; other countries, 8/6. Binding cases may be obtained from the Publishers, price 1/6 each, carriage 3d. extra. A very complete index to volume 34 is issued with this number.

THE FLEETS OF THE MAIL LINES.

(*From our Own Correspondent.*)

Motor-Engined Vessels.

THOUGH the voyage of the Eastern Asiatic Company's *Sumatra* following on her most successful trials, did a great deal to advance the reputation of the new type of propelling machinery the dramatic purchase of her sister ship the *Fionia* by Herr Ballin on behalf of the Hamburg-American Line will probably have even more influence in promoting public belief in the heavy oil motor principle than anything that has yet transpired. We know that the Hamburg Line has already sometime ago ordered more than one vessel with this type of machinery. Yet time was so important that the management could not wait for the delivery of the vessels building to its own specification. It must have a ship at once and so as soon as her trials had been satisfactorily accomplished the ship was bought and added to the fleet under the name of *Christian X.*, the change of name thus perpetuating a delicate compliment to the land in which she was built. It is interesting too to learn that both Sir William White and Lord Pirrie have thoroughly inspected the vessel. We must now conclude that the multiplication of this type of ship will be more rapid.

Amongst the various advantages claimed for the motor ship there is one, and that sufficiently obvious, which I have never seen mentioned. It is that a vessel of this character especially lends herself to the promotion of safety at sea. In steamships the engine and boiler rooms are necessarily vast apartments, and, owing to the close connection between the working of the engines and the firing of the boilers, there must always be a great piercing of the bulkheads which intervene in the machinery spaces of a steamship. But in an oil-engined ship the boilers are eliminated. So are the bunkers. True there will be tanks in the place of the latter. But a bunker door, if not properly closed, will admit vast quantities of water. The oil tank needs nothing but a pipe to extract its contents and carry them to the engines. Further, of course, the great fidleys and air shafts which in steamers it is impossible to avoid, will no longer be required and the engine-room will be the only large space left.

The British Canadian Shipbuilding and Dry Dock Company,

which under its charter granted in April of last year, has an authorized capital of two millions sterling, will now establish its headquarters at Sydney, Cape Breton, that enterprising municipality having determined by a vote of the ratepayers to grant the Company a bonus of a million dollars. The Company is a sufficiently powerful one, the five promoters including Sir Henry M. Pellatt and Mr. J. M. Gibson, of Toronto; Mr. A. C. Ross, of Sydney, and as practical shipbuilders persons of no less weight than Mr. Alexander Gracie, the chairman of the Fairfield Shipbuilding Co., and Mr. Charles Ellis, of Clydebank. Three hundred acres of land have already been secured for the yard at Sydney and no doubt operations will soon be commenced. It is said that the system of granting bonuses to the promoters of trading companies whose operations are likely to be of benefit to the locality has been in operation in Canada for some forty years, though the present grant is the largest recorded. Sydney itself gave a handsome bonus to the Dominion Steel and Iron Company in 1899, though it is not quite clear to what the value of the concession in this case amounted. It consisted of a gift of a site, valued at 350,000 dollars, and of the exemption from municipal taxation, for a period of thirty years. We cannot, of course, guess what the remission of taxation would be worth, though no doubt it was of considerable value. Anyhow, Sydney must have been satisfied with its bargain or it would not have repeated the experiment and that on so much larger a scale.

The International Mercantile Marine Company,

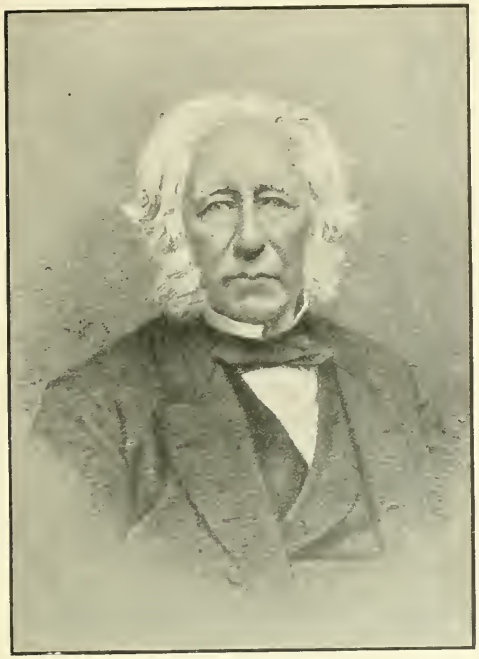
which is generally spoken of as the "Combine," has now published its report and balance sheet for 1911. The figures are more satisfactory than those of the two preceding years. For the gross voyage earnings amount to nearly 38·2 millions of dollars against 36·8 in 1910, and 33·4 in 1909. Operating expenses have, however, also gone up from 29·3 millions of dollars in 1909 to 29·8 in 1910 and 31·0 in 1911. Fixed charges, it should be remarked, are a trifle down and the insurance account has been fortunate in the year under review, so that it was able to contribute some 291,000 dollars to the general balance sheet. So altogether the nett profit is given at 4·5 millions of dollars against 4·8 millions in 1910 and 1·2 millions in 1909. From these 4·5 millions, 3·3 are set on one side for depreciation of the fleet. This does not seem an excessive amount when the "cost of properties" (189·5 millions of dollars) is taken into consideration. But it leaves a surplus of 821,661 dollars to go to the 1912 account. Nothing, therefore, can be paid on the ordinary or preference stocks of the Company. Indeed, a note informs the reader that on the preference stock there has been no dividend since December, 1902. This seems to imply that neither preferred nor ordinary stockholders have ever had any return on their investments.

The Fire on the "West Point"

has been the cause of an interesting series of actions in the law courts. The latest arises from the claim of certain cargo owners for the value of their property which was lost in the ship. The claim was based on two grounds. First, it was said that the shipowners—who were the defendants in this case—were bound to deliver the goods named in the bill of lading, and secondly, they said that the *West Point* was not seaworthy when she sailed on her last trip. The Courts have held, after an appeal to the House of Lords and a remission of the case to the Commercial Court for the trial of issues of fact, that the vessel was not unseaworthy when she sailed and that all reasonable means were taken to make her seaworthy. The term seaworthy, of course, has a meaning of its own in the law courts. The layman who hears the word unseaworthy used is apt to conjure up a picture of a broken-down old sailing tub with gaping seams, rotten decks and decaying rigging. But with the lawyer a very smart ship may be yet unseaworthy for his purposes of the moment. In her first and famous youth a mail steamship which has recently been much before the public eye was held to be unseaworthy—for the carriage of bullion—because her strong-room was not quite all it might have been. A meat ship may be unseaworthy—for the carriage of meat—if her refrigerating plant have some slight flaw which has not been remedied before sailing. It appears that the fire aboard the *West Point* arose in this way. Paraffin oil was carried in a chamber in one of the columns supporting the cylinders of the main engines and when a supply of oil was wanted it was drawn off by a cock. The second engineer was doing something to the cock when it blew out altogether, and the stream of oil thus liberated struck the flame of an oil lamp which he had placed near by. Hence the ignition of the oil and the burning of the ship. What exactly happened to cause the cock to come out did not appear at the trial, as the second engineer was not called and his original explanation was no longer relied upon. But the judge came to the conclusion that the tap had been leaking round the joint, that the second was screwing it up and that, using too much force in doing so, he caused a fracture which brought about the casualty. That being the view of the Court it could not be found that the ship was unseaworthy. For seaworthiness does not involve the supply of every appliance of the newest and latest type. Even an occasional drip of a tap—a defect which could be cured in a moment—would not make a ship unseaworthy. This seems good law and also good sense. For with the numerous and costly appliances nowadays aboard ship it would be commercially impossible to have everything throughout absolutely as it first came from the shop. One of the great mistakes in the public mind seems now-a-days to be the fact that ships are expected to be safer than dry land.

The Hamburg-American Line

has followed the example of the Cunard Company and fitted one of their express liners with a searchlight. The *Kaiserin Auguste Victoria* was the vessel chosen for the experiment, and her light is said to be of 80,000 candle power, which is equal to the capacity of those fitted to German battleships. Though a haze was prevailing off New York when she arrived it was possible by the aid of the light to read the name of the Ambrose Channel Lightship when a mile away and altogether the report of Captain Ruser—the commander of the *Kaiserin*



ROBERT NAPIER.

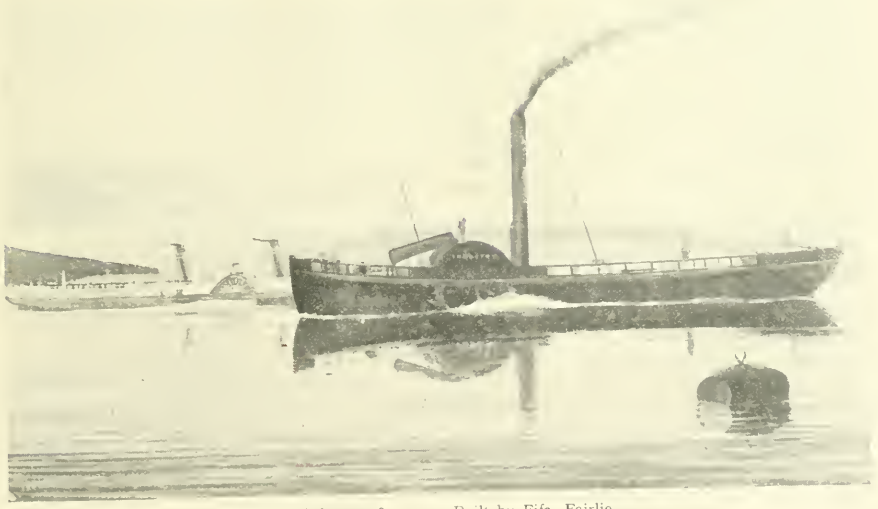
—is favourable, though he seems to indicate that care and judgment will be needed to prevent difficulties arising from the use of such appliances.

The "British Standard"

I suppose we have at last heard the end of the litigation arising out of the loss of the steamship *British Standard* of Cardiff. It will be remembered that the enquiry into the circumstances attending the loss of this new vessel off Cape Frio in May, 1910, occupied a Court of Enquiry for a great many days, the result being unfavourable to the master who, amongst other things, was ordered to pay to the Board of Trade £1000 towards the Board's costs in conducting the enquiry. The master appealed and succeeded in reducing the amount in which he had been mulcted for costs. Then the underwriters—with whom the ship had been insured for £32,000—declined to pay, and an action followed in the Commercial Court. It were too long a business to go over all the grounds on which the refusal to pay was based. Suffice it to say that £32,000 was not an improper amount for which to insure such a ship, for she was new and £32,000 was her contract price. But there were other insurances, including one for about £8000 on freight,—though only £3000 for the outward voyage had actually been arranged—and also policies amounting to nearly £15,000 for disbursements. Mr. Justice Hamilton characterized the insurance on freight as being "very full." But it was over the disbursements that the trouble came. These insurances consisted of a reducing policy for £3300, another for £5500 in London on disbursements and a third for £6000 with clubs on similar risks. Now those who negotiated the policies in London did not mention to the underwriters the fact that this business with the clubs had been carried through, and the learned judge held that this was a material fact which ought to have been disclosed to those who were asked to insure the property. Thus on the ground of concealment of a material fact the shipowners lost the day. On the other issues they succeeded in obtaining costs.

The Board of Trade.

has issued an interesting and valuable return which shows the increase in eighty years of the shipping activity of the country. It is as follows :—



The *Industry*, 1814. Built by Fife, Fairlie.
(The view shows a modern steamer in the background.)

Year	Foreign and British Shipping entered and cleared in the Foreign Trade at ports in the United Kingdom (Tons net)	British Shipping entered and cleared in the Foreign Trade at ports in the United Kingdom (Tons net)	Foreign Shipping entered and cleared in the Foreign Trade at ports in the United Kingdom (Tons net).
1831	5,224,351	4,068,053	1,770,636
1841	2,935,399	0,700,490	2,628,057
1851	3,062,344	0,826,876	0,150,322
1861	4,808,826	15,479,532	11,175,109
1871	8,034,128	28,034,748	13,513,130
1881	9,691,936	31,543,250	16,406,286
1891	8,470,297	33,057,435	20,855,185
1901	108,420	62,270,021	34,409,873
1906	107,332	76,405,979	44,324,331
1907	485,090	81,360,442	51,003,278
1908	11,541,301	77,869,772	53,576,124
1909	11,385,878	79,763,971	53,503,711
1910	11,555,663	79,815,186	54,215,228
1911	11,098,508	81,885,261	57,021,020

Two remarks may be made on these figures. First, it is noticeable that foreign tonnage visiting our ports has increased in greater proportion than that of our own marine engaged in foreign trade. Secondly, it will be observed that the work effected by a ton of shipping has tended to increase enormously. In 1831 a ton of British shipping was entered and cleared twice in the year. By 1911 the proportion had increased so that each ton of shipping appears in the average over seven times a year amongst the entrances and clearances.

The South African Mail Contract.

It would be hard to say whether those interested in the Union-Castle Line or the Government of South Africa are most to be congratulated on the reported agreement between Sir Owen Philipps and Sir David Graaf on this important matter. It must be a great relief to the shipowner to know that the ships of his newly-acquired line will be able to continue their mail and passenger services in the trade in which they and their predecessors established their reputation. On the other hand, ships are mobile, and no doubt if the door of South Africa was slammed in their faces shipowners whose trades have so many ramifications as those under the control of Sir Owen Philipps and Lord Pirrie would eventually find useful employment for their tonnage, even if they had been displaced from the Cape route. But against this is the fact that the South African Government was faced with the alternative of having to provide its own service—a thing which is not only costly but one involving special knowledge and experience of a kind which can hardly be acquired at meetings of free and independent electors. So both sides must be relieved and pleased.

Sir Owen Philipps seems to have scored by not accepting the terms offered to him when in South Africa, since he now secures the Government contract for freight for a term of five years—which is two years longer than the best he could obtain before his embarkation for England. There seems also to be in the contract a stipulation as to the provision of special rates for the carriage of maize—an article which looms large in the export trade of South Africa and which for many reasons it is desirable to encourage as much as possible. But the great point in the terms of agreement is the abandonment by the shipowners of their system of rebates to shippers. On this the Government has insisted throughout and it was because they did not see their way to it, largely on account of their loyalty to the other shipowners who trade to South African ports, and who were also parties to the agreement as to rates, that the managers of the Union Castle line failed to come to terms with the Government and had eventually to retire from the trade they had created. Sir Owen Philipps, coming new to the business, was bound by no traditions and was under no obligations such as affected Messrs. Donald Currie & Co., and was able accordingly to meet the South African Government on an untrammelled footing.

North-East Coast Institution of Engineers and Shipbuilders.—The Council of the above institution will shortly proceed to award the scholarship for 1912 in naval architecture or engineering. Intending candidates, who must be British subjects and graduates of the Institution, should send in their applications on special forms to be obtained from Mr. E. W. Fraser Smith, secretary, North-East Coast Institution of Engineers and Shipbuilders, Bolbec Hall, Newcastle-on-Tyne.

The Strike at the London Docks has been one of the greatest follies of the age, and has been productive of much deplorable misery without redeeming grace. The authors of the trouble are worthy of condign punishment and have been attempting to throw the responsibility and blame upon the shoulders of others, in the usual fashion of those who do wrong and seek to avoid owning up to it. Large percentages of the workers have been thrown idle in the belief that they were going to benefit others in the first place, and themselves incidentally, a process of reasoning fostered by those who instigated the cessation of work, coupled with the dictatorial fiat that all hands were to rest for a day or two and the arms would be accomplished. Workers who have had the courage of their convictions, setting aside the threats extended towards them, and sought employment, are reaping the advantage of constant work, gradually becoming more expert and earning higher wages than has hitherto fallen to their lot. A considerable, probably the more considerable, percentage of the workers were averse to obey the mandate given to "cease work," but won over by specious argument and the whisper that a few days would settle the question, added to a sentiment of loyalty or the dread of reprisals, they left their jobs half finished, to their dishonour, save in some honourable exceptions, where British tradesmen stuck out to complete what they had set their hands to commence rather than bear the reproach which their early training and discipline taught them to abhor. It may be that the exponents of the theory sought to be brought into practice by all or any means have not been very happy in their choice of subordinates, but the methods pursued by some of the latter and the wild imaginings to which they have given utterance reveal an ignorance of the common elements of honesty and industrial economics. The objects held forth by some of the officials bearing the badges of office and to be aimed at are for the individual workers to do a minimum of work in order to obtain a maximum of pay, including overtime, for the aggregate; for all workers to enter into a bond and wear a badge so that it may become all powerful, when foremen will cease to be a factor in the game, and mighty labour will rise independent of capital, ruling all things. The published mandate kept prominently before the eyes of the readers read—"Don't start work until ordered." Couched in such terms as this a species of tyrannical interference is indicated with liberty and equality. The petty annoyances and threats to which women and families of those who have incidentally been connected with men who during the past month have been, and are steadily working at the docks, reveal a disposition savouring of despotic tyranny. A good deal has been put before the general public proclaiming the despotism of the representatives of capital—the captains of industry, but little has been said on the situation as it exists. It may be admitted that, human nature being as it is, all employers are not alike true and straight; the promise of to-day may be forgotten on the morrow in a few instances, but in the long run the conditions of employment move to adjust themselves on the side of the employer who is fair and just in his dealings. The tendency of recent years, due to a variety of causes, parliamentary or political to a great extent, has been in the direction of large syndicates and companies and crushing out smaller firms of employers, hence the loss of individuality and want of knowledge between employer and employed, with the consequent struggle of the middle man who seizes the opportunity to make the most of the situation, from his own point of view, sometimes regardless of the marring result which may ensue.

United States Metallic Packing Co., Ltd.—Some twelve months ago this company acquired a site of about 2½ acres at Allerton Road, on the outskirts of the city of Bradford, and erected thereon large and convenient premises, specially adapted for the manufacture of metallic packings, steam traps, etc., and fully equipped with most suitable appliances. The business has now been transferred from the old premises, and the new works and offices are in full swing. The additional space provided will enable the company to cope more efficiently with the increasing trade. The new address of the company is The United States Metallic Packing Co., Ltd., Soho Works, Allerton Road, Bradford. Telephone Nos. 4705 and 4706.

LLOYD'S REGISTER.

THE statistical tables prepared by Lloyd's Register of British and Foreign Shipping for the 1912-1913 edition of their Register Book show that during 1911 the number of vessels of 100 tons and upwards (excluding yachts) built throughout the world was 1189 vessels of 2,405,681 tons. Of these 628 of 1,671,102 tons were constructed in the United Kingdom. The total number of all classes of vessels built in the United Kingdom was 768 of 1,250,810 tons—670 of 1,238,342 tons being steamers and 98 of 12,468 tons sailing ships. Of the steamers 512 of 1,228,769 tons were of steel, one of 436 tons was of iron, and 157 of 9,137 tons were wood and composite; and of the sailing vessels 41 of 10,140 tons were of steel and 57 of 2,319 tons were wood and composite.

The additions made to the Register of the United Kingdom —including vessels bought from foreign countries and transferred from the British Colonies, as well as new vessels built at home and abroad—amounted to 1,005 of 1,356,251 tons. The removals from the Register during the same period were 1,015 vessels of 1,018,034 tons. The result of the year's additions and deductions therefore is a decrease of ten in the number of vessels registered, but an increase of 338,217 in the aggregate gross tonnage.

The total number of vessels of 100 tons gross and upwards belonging to the several maritime countries of the world as recorded in the Register Book is 30,316 of 44,600,677 tons. Of these 11,444 vessels of 19,874,360 tons are British—9,279 vessels of 18,213,620 tons belonging to the United Kingdom and 2,165 of 1,660,740 tons to the Colonies. America has the next largest tonnage, the number of vessels being 3,442 and the tonnage 5,258,487. Germany has 2,213 vessels of 4,628,983 tons, Norway 2,132 vessels of 2,292,596 tons, France 1,491 vessels of 2,052,518 tons, Italy 1,090 vessels of 1,398,582 tons, Japan 960 vessels of 1,344,991 tons, and Holland 701 vessels of 1,129,906 tons. The number of vessels classed with Lloyd's Register is 10,445.

Wreck Statistics for 1911.

The statistical summary of vessels totally lost, broken up, condemned, etc., now published by Lloyd's Register, shows that, during 1911, the gross reduction in the effective mercantile marine of the world amounted to 888 vessels of 884,843 tons, excluding all vessels of less than 100 tons. Of this total, 427 vessels of 619,752 tons were steamers, and 461 of 265,091 tons were sailing vessels. These figures are lower than those for 1910 by 62,847 tons (47,688 tons steam, and 15,159 tons sail). One of the most common terminations of a vessel's career is by breaking up, dismantling etc. (not in consequence of casualty). The amount of tonnage so dealt with in 1911 was 255,517 tons. This total is 100,637 tons less than that for 1910, which was the highest ever reported in the Society's Wreck Returns. Nearly 29 per cent. of the steamers and about 28 per cent. of the sailing vessels removed from the merchant fleets of the world in the course of 1911 are accounted for in this manner. Of the total tonnage of such cases over 34 per cent. is represented by United Kingdom vessels. Strandings and kindred casualties which are comprised under the term "wrecked" are much the most prolific cause of disaster. To such casualties are attributable over 50 per cent. of the losses of steamers, and over 51 per cent. of sailing vessels. Cases of abandoned, foundered and missing vessels are no doubt frequently more or less similar in the circumstances of loss. If these be taken collectively, they form over 27½ per cent. of the steamers, and 26 per cent. of the sailing vessels removed from the mercantile marine during 1911, owing to casualty. The return has been prepared in such a manner as to enable a comparison to be made between the percentages of loss suffered by each of the principal merchant navies in the world. Great as the absolute annual loss of vessels belonging to the United Kingdom appears to be, it is seen to form but a very moderate percentage of the mercantile marine of the country, and to compare favourably with the losses sustained by the other principal maritime countries.

THE IRON AND STEEL INSTITUTE.—The Autumn meeting of the Institute will be held at Leeds and commence September 30th., ending October 4th.

BULKHEADS AND WATERTIGHT COMPARTMENTS.

WE understand that the Departmental Committee recently appointed by the President of the Board of Trade to advise on the watertight sub-division of merchant ships of all classes is now about to consider the question of the construction and fitting of watertight doors. Those makers who desire to bring their inventions to the notice of the Committee can do so by writing in the first instance to the Secretary of the Bulkheads Committee, Board of Trade, Whitehall Gardens, London, giving an outline of what they wish the Committee to consider with relative papers. It would be well for inventors, who are not engineers or Naval Architects to take expert advice before sending in their proposals.

COMMITTEE ON DERELICTS.

THE President of the Board of Trade has appointed a Committee to consider the question of the dangers to shipping caused by derelicts and other obstructions and the measures now taken to deal with such dangers. The terms of reference of the Committee are as follows:—"To enquire and report as to the measures at present taken to protect shipping from the dangers of floating derelicts and sunken obstructions and as to what changes, if any, are desirable." The Committee is constituted as follows:—Sir Archibald Williamson, Bart., M.P. (Chairman), Mr. Ion Hamilton Benn, M.P., Sir Frederick Bolton, Captain Robert Hoare, Captain J. Mackay, Mr. H. N. de M. Malan, Captain J. F. Parry, R.N., The Honourable T. H. W. Pelham, C.B., Captain Henry Samman and Mr. J. Havelock Wilson. Mr. U. Wolff, of the Board of Trade, 7, Whitehall Gardens, London, S.W., has been appointed Secretary to the Committee, and all communications relating to its work should be addressed to him. The first meeting was held on the 22nd July, and was limited to considering the procedure of the committee and the nature of the evidence to be taken. It was decided that the meetings be held in public.

BRITISH ASSOCIATION.

THE 82nd annual meeting of the British Association for the Advancement of Science will be held during the 4th—11th of September at Dundee. The programme for Section G—Engineering is as follows:—Presidential address by Prof. A. Barr; joint discussion with Section A on wireless telegraphy; Prof. J. H. Biles, "The rolling of ships"; Prof. Chatley, "The control of aeroplanes"; Prof. E. G. Coker, "The experimental determination of the stresses in plate springs"; Mr. Dugald Clerk and Herr Hans Holzwarth, "The gas turbine"; Prof. A. H. Gibson, "The suction between passing ships"; Mr. Chas. E. Larard, "The kinematographic reproduction of some torsion tests on ductile materials"; Mr. H. A. Mavor, "Ship propulsion"; Mr. Alex. Welin, "Lifeboats on ocean-going steamers and their manipulation"; Mr. H. E. Wimperis, "The acceleration of a motor car"; Prof. J. B. Henderson, "Problems in propulsion through air and water"; Sir J. A. Macdonald, "The road problem"; Prof. Hopkinson, "The force of a blow"; report of Committee on Gaseous Explosions.

MARINE MOTOR NOTES.

THE transfer of the *Fiona* from the books of the East Asiatic Co. to those of the Hamburg-Amerika is an indication that the oil propelling machinery is gaining on the conservatism of shipowners; the change of ownership has brought about a change of name to *Christian X.* On the occasion of a visit paid to the *Fiona* the Kaiser, in a congratulatory message sent to the King of Denmark paid a graceful compliment to Messrs. Burmeister & Wain for the pioneer work they have successfully accomplished in connection with the marine oil motor. The East Asiatic Co. it is stated has ordered a vessel to replace the *Fiona*. The *Selandia* appears to have successfully and creditably completed her maiden voyage to Siam and back to Copenhagen, thereafter proceeding to London prior to setting out on her second voyage. The *Jutlandia* after undergoing a series of trials on the Clyde, left for the Continent *via* London to load for her first voyage to the East. Messrs. Burmeister & Wain have several other orders in hand for vessels of approximately similar power and tonnage to those for the East Asiatic Co.; one of these is for the South American trade. The Canadian Lake vessel about 250 ft. long, built by the Clyde Shipbuilding Co., recently launched at Port Glasgow, is being fitted out with machinery of the Carel-Diesel type of 1,000 h.p. She was named the *Fordonian*. The vessels for the coasting Motor Shipping Co. are gradually finding their way into the water. The *Innisbeg*, fitted with Beardmore 80 h.p. oil engines, had her trials during the month. The number of small motor vessels and yachts has been increasing considerably round the coast of Britain, while motor-driven fishing boats in certain districts are multiplying.

At various ports on the North-east Coast of Scotland considerable activity exists in respect of new fishing craft on which motors will be installed. As evidencing the spread of the motor system in this direction, it is interesting to note that at Banff there has recently been completed the first of five motor vessels which are on hand to the order of the Irish Congested Districts Board, who have not hitherto supplied anything but sailing boats to Irish fishermen, and who have at present seven of these under way at Banff. The first of the five motor vessels ordered has been completed by Messrs. Stephenson & Asher, Banff, and after successful trials left for Ireland on July 18th. This craft is 63 ft. overall by 18 ft. beam, and is fitted with a Gardner vertical paraffin engine of 48 b.h.p. A speed of 7¼ knots has been attained, and when assisted by sail spread 9½ knots. The engine-room is 9 ft. in length and extends the full breadth of boat, but a tank for paraffin fuel on each side reduces the width to about 6 ft. Each tank can accommodate 300 gallons and as the consumption of paraffin per hour is four gallons, the boat can be run for a week at top speed without replenishing. The engine, it may be added, can be controlled from the deck.

In addition to the motor vessels on order for the South American trade, enquiries have been issued by Argentina, and tenders are invited by the Minister of Public Works, Buenos Ayres, for two passenger and two cargo motor vessels. The appeal made to the Government relative to grants for fishermen to enable them to procure motor fishing craft, has been met by a promise of help in this direction of commercial credit grants, such having been successfully worked at some of the fishing centres, notably in Cornwall, where good results had accrued. The report of the Fishery Board (Scotland) is as interesting as usual, and conveys a strong impression in favour of the motor fitted fishing boat. Those who are desirous of following the course of vessels of this description will find the report worthy of study.

Institute of Marine Engineers.—Lloyd's Register Scholarship Examination.—The examination for the Lloyd's Register scholarship of £50 per annum tenable for two years, given under the auspices of the Institute of Marine Engineers, was held on July 8th and 9th. Seven candidates presented themselves for examination at the Glasgow, Newcastle and London centres, the first place being gained by Mr. Ian Garvie (graduate), of Mansfield, Gourock, apprentice with Messrs Scott & Co., of Greenock. Mr. Archie Allan, of 22 Brislee Avenue, Tynemouth, apprentice with Messrs. R. and W. Hawthorn, Leslie & Co., Ltd., St. Peter's Works, Newcastle-on-Tyne, was placed second.

NAVAL MATTERS—PAST AND PROSPECTIVE.

(From our Own Correspondent.)

Portsmouth Dockyard.

THE event of the month was, of course, the assembly of ships at Spithead, where 223 vessels of all kinds were present on July 9th, in addition to two aero-hydroplanes and one aeroplane. About 440 members of both Houses of Parliament embarked in the steamer *Armadale Castle* at Southampton and inspected the fleet. Among the guests on board the Admiralty yacht *Enchantress* were the Prime Minister, the Canadian Ministers and the foreign naval attachés. The ceremony was favoured with fine weather and was a complete success. Flights were made by the aero-hydroplanes, and the programme also included attacks by destroyers and submarines. The vessels afterwards left to coal and complete preparations for the manœuvres, the principal ships of the "Blue" Fleet, under Admiral Prince Louis of Battenberg, with his flag in the battleship *Thunderer*, proceeding to Lamlash, and those of the "Red" Fleet, under Admiral Sir George Callaghan, going to the Nore. The manœuvres were to commence at midnight on the 11th, the main idea being an attacking fleet attempting to land troops and to capture or blockade all the shipping ports on the North-east Coast of Scotland. A party of six hundred marines proceeded from this port by steamer to the Orkney Islands to take up a defensive position and prevent any attempt to land. The Parliamentary inspection was the last public function which Admiral Sir Arthur Moore will take part in as Commander-in-Chief at this port, as on July 30th he will retire from the service and be succeeded by Admiral Sir Hedworth Meux—better known perhaps as Admiral Lambton. The armoured cruiser *Roxburgh* underwent an extensive overhaul preparatory to taking part in the manœuvres, and overtime had to be worked to get her ready in time. The *Cochrane* on being docked for examination of her steering gear, which had given some trouble, was found to have sustained extensive damage. She had evidently fouled some submerged wreckage, two of the side plates having been torn away from the fore part of the rudder and a portion of the casting being missing. The damaged rudder, weighing some twenty tons, had to be removed and a new piece fitted. The damage was put right in time for the *Cochrane* to join the Second Cruiser Squadron for the manœuvres. As regards new construction, good progress is being made with the *King George V.* and *Iron Duke*. The battleship *Exmouth*, flying the flag of Admiral Sir Edmund Poë, the late Commander-in-Chief in the Mediterranean, arrived on June 27th, and on July 2nd the Admiral struck his flag. Before leaving the vessel Sir Edmund made a farewell speech to the officers and men, who were formed up on the quarter-deck, and as he left the ship they gave him hearty cheers and the ship's band played "Auld Lang Syne." Two officers recently serving at this port have been appointed for service on the staff of the Ottoman Navy under Rear-Admiral A. Limpus. They are Commander A. Ashby, lately navigating officer of the battleship *Zealandia*, and Lieutenant G. Hallifax, who had been serving in the torpedo schoolship *Vernon*.

Devonport Dockyard.

The Commander-in-Chief at this port, Admiral Sir William May, who was selected to act as umpire-in-chief for the manœuvres, had as his flagship the cruiser *Euryalus*. It was expected that he would have had the cruiser *Sutlej*, which has been refitted at a cost of over £70,000. Never before has such a large number of ships been fitted out for manœuvres here. Over sixty vessels, ranging from battleships to submarines, were manned and stored without the slightest hitch. The new battleship *Thunderer*, in which Admiral Prince Louis of Battenberg hoisted his flag as Commander-in-Chief of the "Blue" Fleet for the manœuvres, was the scene of an unusual accident when taking in ammunition, the reports of which have been greatly exaggerated. According to the official account a shell was being lowered, and when about half-way down, owing to a kink in the wire whip, a turn came off the drum of the electric winch, and the projectile fell to the deck of the shell room, the cap being knocked off the fuse. The shell was hoisted up again and the fuse examined and

A BIRD'S-EYE VIEW OF IMMINGHAM.

The Dock at Immingham, constructed by the Great Central Railway, and provisionally opened on May 15th, was formally opened on the 22nd of July by the King, who was accompanied by the Queen. An elaborate programme was carried through in connection with the Royal visit, and a large and representative gathering witnessed the inauguration. The dock, which was named "King's Dock," is the deepest on the East Coast, and is situated nine miles from Hull on one side, and six miles from Grimsby on the other. Vessels of the largest class can be accommodated, and free ingress and egress at any state of the tide obtains. The area of the dock property is just over 1,000 acres, is two and a half miles in length and one mile in breadth, and, exclusive of locks, the water area is forty-five acres. The railway sidings and lines extend to 170 miles, and are sufficient for over 11,600 wagons, carrying upwards of 100,000 tons. Up to the present £2,600,000 have been spent upon the work; this sum, it is anticipated, will be increased by about £400,000 before the work is completed. A graving dock is provided 740 feet in length, 56 feet in width, and with a depth on sill of 23 feet.

found correct, a new one was put on and the shell was returned to its bay. No one was hurt and the work of taking in ammunition was not stopped. It has been announced that one of the new light armoured cruisers, which were originally intended to be built by the private shipyards, is to be built here. Provision is made for the vessel to be considerably advanced during the present financial year. There will therefore shortly be witnessed the unusual spectacle at this yard in recent years of four vessels on the building slips at the same time. The battleship *Marlborough*, in course of construction on the new slip at the South Yard, will be launched about October but before then the keel plates will be laid of the new cruiser and also of two oil tank vessels which are to be built on the covered slips of the South Yard. The slips are now being prepared. In addition, provision is made in the Estimates for the expenditure of £100,073 on a large armoured ship to be laid down after the *Marlborough* is launched. In connection with the construction of the battleship *Centurion*, an armoured battery and super-imposed armoured casemate is to be introduced for the auxiliary armament. This will necessitate a change in the positions of the funnels and masts, as compared with previous battleships, and a reversion to single masts, as in the *Lion*, is in contemplation. The cruiser *Powerful*, having been selected for service as overflow ship to the boys' training establishment *Impregnable*, has been brought round from Portsmouth. The gunboat *Antelope* is also to be brought from that port to be refitted. The coast guard cruiser *Colleen* has arrived and been paid off. The question of her disposal is under consideration. At the sale on July 9th the battleship *Nile* went for £34,500; the destroyers *Dragon* and *Teazer* fetched £1,830 and £1,820 respectively; and the *Undine*, late steam yacht of the Commander-in-Chief at the Nore, went for £1,500.

Chatham Dockyard.

At the beginning of the month there were fourteen vessels belonging to the Third Fleet lying in the basins, and these, with the destroyers and vessels undergoing refits, gave the basins a somewhat congested appearance. The battleship *Dominion* has completed refitting and has left for Torbay. After the manœuvres she is to return to recommission for further service in the Second Fleet. The cruiser *Amethyst* has also been completed and has left for the Firth of Forth to join the Eighth Destroyer Flotilla for the manœuvres. The battleship *Vengeance*, which has been employed in Gillingham Reach as a turret drill ship and has flown the flag of the Commander-in-Chief at the Nore, has joined the Third Fleet for service in the Eighth Battle Squadron. She is to undergo a thorough refit. The mobilization for the manœuvres was carried out in a most expeditious manner. Although no vessels were specially commissioned, nearly four thousand officers and men were required to bring the ships' complements up to their proper strength, and calls were made upon the training establishments, while the Reserves and Coastguard contributed about five hundred. The destroyers *Harpy* and *Grasshopper* have completed their refits and have gone to Harwich to rejoin the Third Flotilla. The battleship *Duncan* recently came on a brief visit while home from the Mediterranean. She was placed in the basin under the 160-ton crane to exchange one of her 12-inch guns and to land reserve gun mountings. The ship's staff removed the roof of the turret, and the workmen commenced work in the afternoon, the new gun being placed in position the same night. The *Duncan* was subsequently placed in dock, but she remained less than a week. The dockyard school has again failed to come out so well as Portsmouth and Devonport, in the midsummer examinations, but taking the results as a whole they are fairly creditable. Rear-Admiral C. Anson, who has been appointed admiral-superintendent, is to take over the duties on August 9th, in succession to Rear-Admiral R. Ommanney, who leaves on the expiration of his period. A link with the past has been severed by the death of Mr. Trafalgar Brattle at Gillingham. Mr. Brattle, who was over eighty years of age, was the son of Lieut. T. Brattle, a marine officer who served in the *Victory* with Nelson at Trafalgar. He was a naval store officer and retired from this yard forty years ago.

Sheerness Dockyard.

The sinking trials of the new floating dock, which arrived last month from Wallsend-on-Tyne, were carried out on July 10th in Saltpan Reach under the superintendence of officials from Chatham. The tests proved very successful, the dock being sunk to a depth of thirty-six feet from the top of the blocks and raised again without the slightest hitch. The battleship *St. Vincent*, the second flagship of the First Battle Squadron, is to be refitted at Chatham after the manœuvres, and it therefore seems probable that she will be the first vessel to go into the new dock for refit, as only by placing her there can the repairs be carried out. The battleship *London*, which had been fitted with a launching platform for aeroplanes, left on July 3rd for Portsmouth for the review a few days later. Captain Gratton, the commanding officer of the *London*, was in command of the *Hibernia* when that vessel was used as an aeroplane ship on the occasion of the review at Weymouth by the King. The new surveying ship *Endeavour* has been delivered from the works of the Fairfield Shipbuilding and Engineering Company. She is to be employed abroad, and is the first vessel to be built specially for survey work in foreign waters, the ships hitherto engaged on that work having been gunboats or sloops, which have been fitted for the purpose after finishing their careers as warships. The *Alecto*, tender to depot ship for submarines, has also arrived, and has been commissioned for service with the Seventh Submarine Flotilla. The steam mooring lighter *Resource*, attached to Portsmouth, is to be sent here to be fitted with apparatus for raising submarines of the "C" class, there being no lighter at Portsmouth capable of salving such vessels. The destroyer *Zebra*, of the Nore Flotilla, has been paid off as unfit for service. She is to be placed on the sale list. Submarine *C 8*, of the Sixth Patrol Flotilla, was brought in on June 28th from Harwich by the torpedo gunboat *Hebe* for repair, her tail frame having been damaged in collision with *C 10*. Submarine *C 8*, which only left here a few days previously after refitting, was taken into No. 1 Dock, where *C 30* was under repair, having damaged her bow casting at Rosyth. The repairs to the latter vessel have now been completed. On July 16th Submarine *C 10* arrived for her damage to be made good. Other vessels in hand are the destroyers *Brazen*, *Recruit* and *Earnest*. Lieutenant M. Morrison, of the Commander's department, has retired from the service by reason of age. He entered the Navy as a boy in 1872, when he joined the training ship *Boscawen*, and he has had an eventful forty years. On leaving he was presented with a parting souvenir by his brother officers as an expression of their esteem. Lieutenant F. Elliott, lately serving as gunnery officer in the battleship *Commonwealth* in the Second Fleet at the Nore, has been appointed for service in the Turkish Navy under Rear-Admiral Limpus.

Pembroke Dockyard.

On July 3rd the Admiralty yacht *Enchantress* arrived here with the First Lord on board. Mr. Churchill disembarked and made an inspection of the yard, but the visit was a very short one and in the afternoon he left for London by tram. The progress of the haulage slipways for destroyers, which will bring the equipment of the yard for carrying out destroyer refits more up-to-date, attracted particular attention. The construction of the new unarmoured cruiser *Nottingham* is being proceeded with as rapidly as circumstances will permit, and the launch may be expected to take place in less than five months' time. At the time of the First Lord's visit only the greater part of the flat keel was in place, which is most unusual three weeks after a ship has been commenced. The commencement of the *Nottingham* may be regarded as opportune, but she will not provide work for the same number of men as previous vessels have. She is being built by piecework. The propelling machinery is to be provided by Messrs. Hawthorn, Leslie & Co., Newcastle, the cost being put down in the Estimates at £61,500. Both the *Amphion* and *Fearless* have been advanced to such a degree that a reduction of hands on each of these should shortly be made. The turbines for the *Fearless* are to be similar to those to be fitted in the *Amphion*, which will be of a type different from any fitted in previous ships. The change has caused a delay in the delivery of the *Amphion's* turbines, and as they are to be thoroughly tested before those for the *Fearless* are put in hand a delay will necessarily ensue in the case of the latter vessel. The destroyer *Rother*, which has been retubed, obtained 25 knots at her full-power trial, which is said to be a greater speed than the vessel had reached before. She subsequently proceeded to Sheerness preparatory to going on to the Firth of Forth to join the Fifth Destroyer Flotilla

for the manœuvres. The *Rother* is the ninth destroyer which has undergone a thorough refit here. The *Waveney* and *Wolf* are still in hand. Engineer-Commander L. Hobbs has vacated his appointment as engineer-assistant to the Chief Constructor on promotion from lieutenant, and has been succeeded by Engineer-Lieutenant W. Reed.

FOREIGN NOTES.

Brazil.

THE Compagnie de Pesca Pareuse in Para has had a motor fishing vessel built at the shipyard of the Société An. Cockerill at Hoboken in Belgium. The vessel, which has received the name of *Cameron*, is of 67 gross tons. The motive power consists of two Bolinder crude oil marine motors of 80 to 100 h.p. each, giving the *Cameron* a speed of 10 knots. The *Cameron* is to travel to its destination under its own power. The Compagnie de Pesca, it is said, intend to place further orders for similar boats.

Canada.

A wave of prosperity has been rising over the Dominion, and there is a desire to strengthen the bond with the motherland of Britain. With this object in view the Premier and several of his colleagues in the House of Representatives are now on a visit to the British Government, in order that an interchange of thought on both sides may lead to a definite policy for mutual benefit, including defensive compact. Encouragement is given to capitalists to develop the industries by their organizing talent, conpled with the means necessary for applying it, and to settlers to develop the land willing to yield its produce to the painstaking agriculturalist or the fruit farmer. The capitalist who works with his head and his money, and the worker who works with his hands and his energy, are alike appreciated for what each can do in his own vocation, according to his ability for the country as a whole.

An interesting event took place at Port Arthur recently in the launch of the first steamer, about 250 ft. long, for the Montreal trade; a sister vessel is in process of building for the same owners. There are also in conrse of construction a vessel of 5,000 tons, to carry goods and passengers for the Georgian Bay trade, and a small inland lake boat for passenger service.

Another interesting event was the completion of the first waggon at a recently started waggon factory. Ground has been taken for a railway carriage works, which is about to be built; the electric power for the works is to be obtained by means of water-power from Kahabeka Falls, some twenty-two miles away, the cost being reckoned at about 25 dollars per H.P. per annum. Additional iron and steel works are spoken of, and another railway to connect up some of the outlying districts with the trade centre is proposed. From these few notes it will be observed that security to the capitalist gives security to the worker for their joint advantage.

France.

Two steel hopper barges, each of 500 tons carrying capacity, have been purchased by the well-known French contractor, Mr. Chagnaud, for service in the work at the extension of the Marseilles Harbour. They will shortly be towed to their destination by an English tugboat contractor.

The *Auguste Conseil* has just been snccessfully launched at the Chantiers de France, built to the order of the forwarding Company Offreteurs Réunis. This steamer has been specially constructed for the transport of wine. The steamer was launched already fitted with an engine of 1,500 h.p. and boilers.

Germany.

The Tecklenborg Shipyard has just launched the cargo steamer *Essen* at Bremerhaven-Geestemunde, built to the order of the German Australian Shipping Co., at Hamburg. The *Essen* is the fifth steamer in the course of one year which has been built in this yard for the Australian line. A sister ship is in conrse of construction at the yard. The vessel has a carrying capacity of 9,600 tons, and will be fitted with a "wireless" apparatus. The motive power is supplied by a triple-expansion engine of 3,750 i.h.p. The *Essen* will have a speed of 12½ knots.

The *Renata Amsuick*, a new cargo and passenger steamer, built to the order of the Hamburg Woermann Line, has just been successfully launched at the Bremer Vulkan Shipyard at Vegesack. Her carrying capacity is 6,000 tons, length 113·38 m., breadth, 15·14 m. The motive power consists of one quadruple-expansion engine of 2,000 i.h.p., giving the vessel a speed of 11 knots. A sister ship is in course of construction at the same yard.

The *Elsass*, built to the order of the North German Lloyd by the Bremen Vulkan at Vegesack, has now been successfully launched and is to be completed as rapidly as possible to take up cargo and passenger service to Australia. She has a carrying capacity of 11,000 tons and is fitted up with all modern appliances. A triple-expansion engine of 4,500 i.h.p. has been installed. The vessel will have a speed of 12½ knots. The Vulkan yard has two further steamers for the same firm in course of building for the South American line.

The new steamer building for the North German Lloyd at a Kiel shipyard is to receive the name of *Columbus*, and is to be a vessel of 35,000 gross tonnage. Her length is 236·24 m. and her speed will be 20 knots. In addition to cargo the *Columbus* will have accommodation for 3,700 passengers.

The German-American Petroleum Company has given the Neptune Shipyard at Rostock an order for a petroleum motor boat of 10,000 tons, to be delivered at the earliest possible date.

The *Karnak*, of 12,200 tons carrying capacity, built to the order of the German Steamship Company Kosmos, at Hamburg, by the Tecklenborg Shipyard, has now been put through her trial runs and delivered to her new owners. At the same yard three sister ships are also in course of construction. The *Karnak* is fitted with a triple-expansion engine.

The *Titania*, a new steamer built at the shipyard of the Koch Company, has just been put through her trials, which proved very satisfactory, a speed of 11 knots being developed. The *Titania* is fitted with a triple-expansion engine developing 800 h.p. The vessel is to run between Hamburg and London and will also carry passengers, accommodation being provided for twelve passengers of first class and 100 between decks.

Greece.

It is officially reported that the Greek Admiralty has decided to place an order with the Vulkan Shipyard of Hamburg-Stettin for two destroyers of 700 tons and six torpedo boats, the first of which is to be completed in seven months. As yet the other orders for the ships to be built are still outstanding, although it is rumoured that a part of the orders will be placed with British builders.

Holland.

The Holland-America line has acquired a new steamer of 9,000 tons in conrse of construction at the shipyard of Messrs. Gray & Co., at Hartlepool. The vessel is to be ready for sea by February of next year, and will have a speed of 12½ knots. The purchase price is stated to be £81,000. The equipment of this new steamer is to include all modern arrangements for the comfort of passengers.

Italy.

Recently some trials have been carried out at Spezzia with a new hydroplane designed by the Naval-Lieutenant Calderana, which is fitted with a motor of 100 h.p. and is able to take seven persons on board. The trials are reported to be very satisfactory. The weight of the hydroplane is only 13 cwt.

The *Dante Alighiri* has gone successfully through its engine trials.

Norway.

The Committee of the Storting recommended the granting of twenty million krones for defence works, including the construction of two battleships. It is very possible that the Storting will agree to this, as the general wish is to create a strong fleet as soon as possible.

Sweden.

The armoured cruiser which is in course of construction at the Fimboder Shipyard is to be completed in the early part of next year. The cost of construction up to now amounts to 2,300,000 krones.

The German steamer *Hilde Podens*, of 1,665 gross tons, built at Emden in 1908, has been sold to the firm of Thor Thoresen, junior, at Christiania.

OBITUARY.

William Hamilton, Shipbuilder.

We regret to have to put on record the death of Mr. William Hamilton chairman and founder of the firm of William Hamilton & Co. Ltd., Port Glasgow which took place at his seaside residence of Arnhall, Whiting Bay Arran, on July 10th. The demise of Mr. Hamilton who was in his seventy-fourth year, is deeply regretted in Clyde shipbuilding circles and will be felt over a wastly wider area as concerned with shipping, as he had had a lifelong connection with both industries. A native of Saltcoats, Mr. Hamilton, went to Port Glasgow in his early youth, and served his apprenticeship in the yard now occupied by Messrs. Hamilton but then tenanted by Messrs. John Reid & Co., who had been associated through business and marriage relationship with the older firm of Messrs. John Wood & Co. whose name at this time is in the mouths of many as the builders of the pioneer steamboat *Comet*, owned and managed by Henry Bell. The history of the firm, of which Mr. Hamilton was the founder, and with which he was more or less associated up to the last—particularly as regards the *Comet* connection just referred to—is illustrative of the remarkable progress of shipbuilding on the Clyde, especially during the past forty years. When Mr. Hamilton founded the business in 1867 operations were begun in the "Old Bay" yard, in the east end of the town, and at an early stage in its career he was joined by his brother, the late Mr. John Hamilton. The first contract secured was one from the Turkish Government for two good paddle steamers for passenger service on the Bosphorus. From the outset the business was conducted on successful lines, and before long the firm had to look out for a new yard. The Newark yard, now occupied by Messrs. Fergusson Bros., was then acquired, and here many noted sailing vessels, particularly the *Palgrave*, the largest vessel of her time, were constructed. Through time the accommodation at the Newark yard proved inadequate, and once again the firm had to purchase an enlarged site, and the transfer to the present Glen Yard took place in 1894. The business continued to extend rapidly, and during the next eight years the Glen Yard was extended until now it has a river frontage of 700 ft. and covers an area of 30 acres. New plant and up-to-date machinery have been introduced up till now, when the yard is one of the best equipped in the kingdom. In 1887 Mr. Robert Harvey, Mr. John Hamilton Harvey and Mr. Thomas Hamilton became associated with the business, and five years later Mr. John Hamilton retired from the firm. Mr. Robert Harvey died in 1895, and Mr. Thomas Hamilton retired in 1901. Mr. John Hamilton Harvey continued a director of the firm, and towards the end of the nineties Mr. John W. Hamilton, son of the founder of the firm, was assnmed a partner. In 1904 the concern was converted into a private limited company, when Mr. Alexander M. Kennedy, who had been trained and become a director in the shipyard of A. McMillan & Sons, Dumbarton, joined the firm. At this time further extensions to yard area and improved equipment of shops were carried out, including nine berths, some of which are capable of taking vessels up to 850 ft. in length. The firm is now one of the busiest on the Clyde, and last year they launched vessels totalling 26,200 tons, as against 22,825 in 1910. Messrs. Hamilton and Co. were the first firm in the United Kingdom to secure a licence for the "Isherwood" system of longitudinal frame construction of ships. They built in 1909 the *Carster Hall*, the first cargo vessel built on the Isherwood system to Lloyd's register classification, and also the first of its kind to be launched on the Clyde. In all, up-to-date, twenty vessels have been constructed on this system by the firm, who, it may be added, have also been eminently successful in constructing floating docks, caissons, etc., for both Norwegian and Dutch companies. Recently they have received their first order in this line from the British Admiralty for a dock capable of lifting torpedo craft.

James Dunn.

We regret to record the death on the 17th of July of Mr. James Dunn, formerly assistant director of naval construction at the Admiralty, and later naval director of Messrs. Vickers, Ltd. His death took place suddenly while at a meeting of the Employers' Federation at York. Although more closely associated with the Navy, Mr. Dunn had rendered good service to the mercantile marine, and in 1875 was deputed to survey merchant ships with the purpose of their selection as auxiliary cruisers. In 1885 he was the Admiralty representative on the Load-line Committee and served in 1898 on a second committee on the same subject. Mr. Dunn was a vice-president of the Institution of Naval Architects.

Titanic Inquiry.—At the time of going to press Lord Mersey's report had not been issued, but will probably be published by the time this number is on sale. We shall deal with the report in our September issue.

Oil v. Coal.—The Government have decided to appoint a Royal Commission to investigate the problem associated with the future means of propulsion of Royal naval vessels, with special reference to the use of oil instead of coal. Admiral Fisher will act as chairman of the Commission.

Prof. Junkers' Oil Engine.—An interesting booklet has recently been published entitled "Investigations and experimental researches for the construction of my large oil engine," by the well-known German authority on motors, Prof. H. Junkers. The pamphlet is well illustrated and written, and contains much valuable information. Copies in English are obtainable from the London branch of the Verlag fuer Fachliteratur, G.m.b.H., of Berlin, at 4, Broad Street Place, E.C. Cost, 2s. 2d. per copy including postage.

Launch at Hoboken.—On June 25th, there was launched at Hoboken a steel screw steamer, named *Victoria*, which has been built to the order of the Svenska Lloyd, of Gothenburg, for their regular line between Sweden and Spain. The vessel, which is 240 ft. long, will carry 2,170 tons on 17 ft. draught. She is built to Bureau Veritas highest class, and has cellular double bottom and fore and after-peak tanks for water ballast. The vessel will receive triple-expansion engines by the North-Eastern Marine Engineering Co., having cylinders 20 in., 33 in. and 54 in. by 36 in. stroke, taking steam from two multitubular boilers fitted with forced draught.

The South Durham Steel & Iron Co., Ltd., Stockton, have just laid down one of the latest patent triple combined weighbridges, with a total capacity of 100 tons. The machine has been designed and manufactured by Messrs. W. & T. Avery, Ltd., of Birmingham, specially to suit the large increase in the size of steel plates, etc. The machine has three separate platforms, having a combined length of about 55 feet. It is provided with only one weighing beam or steelyard, and is so constructed that any combination of the three platforms can be brought into use or thrown out of gear as desired. The weighbridge was thoroughly tested to its full capacity when placed in its permanent position, and the steelyard, when indicating a load of 100 tons, was sensitive to 1 lb.

The Institute of Marine Engineers' Proposed City Premises.—The Institute of Marine Engineers has been offered a site on which to build premises in the City of London, and negotiations are pending with a view to advantage being taken of this offer. The site is central and within easy approach from Fenchurch Street and Mark Lane stations. The Port of London Authority has acquired a large area adjacent to Mark Lane and extending towards Trinity House with the object of erecting extensive buildings. This will have the effect of improving the surroundings. It is on the other side of Trinity House at the south end of the Minories, towards the Mint and near the approach to the Tower Bridge, where lies the site that has commended itself to the Committee of the Institute, who have recommended it to the members for acceptance. Subscriptions are being received for the carrying out of the undertaking, the sum of £4,900 has already been raised and we have pleasure in commending the enterprise to our readers for their support. We have had the honour of contributing, and it is an honour, considering what the Institute has already done and the great work it has yet to do for the sea-going marine engineers, expressly on whose behalf and for whose benefit it was founded and is carried on—to a large extent by voluntary and self-denying labour.

FRAHM ANTI-ROLLING TANKS.

AT the time that Herr H. Frahm read a paper before the Institution of Naval Architects on the results of the trials of anti-rolling tanks at sea, we gave in our issue of May, 1911, a description dealing with the theoretical questions which governed the efficient action of such contrivances, and having regard to the great interest which the system has aroused amongst ship owners, and the extent to which the system has been applied, which is represented by an aggregate tonnage of over 400,000 gross tons, we feel satisfied that our readers will be interested in some of the details of the arrangements that have been adopted.

In the application of the system of anti-rolling tanks to vessels it has been found desirable, in order to obtain accurate records of the rolling amplitude and period of oscillation of the particular ship in question, to have installed on the ship a gyroscopic pendulum working in conjunction with a timing device, and means for constantly recording both the amplitude and the period of oscillation, and the diagrams which we illustrate are produced by such apparatus.

There are two systems that have been adopted, one in which one or more tanks are on the weather deck, and the other in which the tanks are placed on the top of the double bottom.

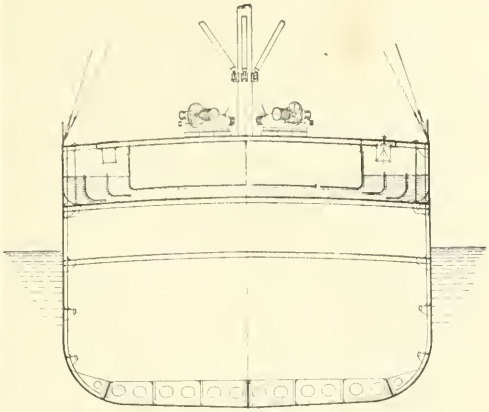


Fig. 2. s.s. *Ypiranga*.
Section of the Fore Anti-Rolling Tank.

Fig. 1. Forward Anti-Rolling Tank of the Hamburg-American Liner *Ypiranga*.

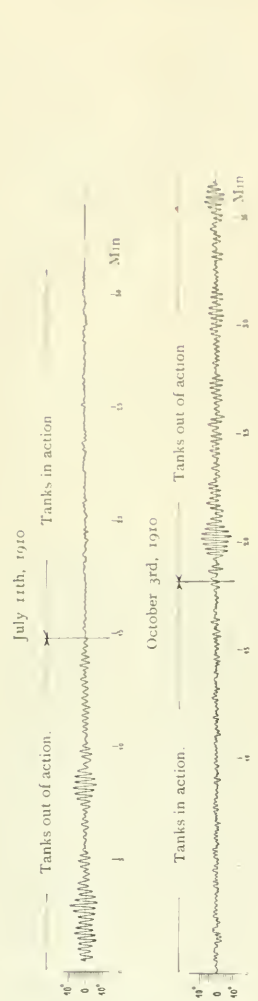


Fig. 3. S.S. *Ypiranga*.

Fig. 5.

Dealing with the first system, Fig. 1 is a view of the forward anti-rolling tank of the Hamburg American liner *Ypiranga*, and Fig. 2 is a transverse section of the ship. In this case the total weight of water in the tanks is 188 tons, which is equivalent to 1·45 per cent. of the load displacement. Fig. 3 shows the effect produced when the tanks are out of action and when the tanks are in action, from which it can be clearly seen that, when in action, the angle of heel is reduced to an extremely small amount.

The other system is represented in Fig. 4, which illustrates a transverse section of the German East African liner *General*. The tanks in this vessel are two in number, and are placed on the top of the double bottom and extend at the sides for a length of forty feet. The weight of effective water in this case is 166 tons, or ·122 of the load displacement.

Fig. 5 shows a diagram of the oscillations of the ship when the tanks were in and out of action, from which it will be seen that an oscillation of 15° each way in one case has been reduced to 4° by the action of the tanks.

In order that our readers may have some idea of the relative size of the tank with the vessel itself, we show in Fig. 6 a view of a passenger and cargo steamer of 840 feet length, 98 feet breadth, 33½ feet draught, and a displacement of 51,000 tons. The tank is indicated both in the side view and the cross section, and has a capacity of 300 tons or 0·6 per cent. of the displacement.

It will be remembered that, while the side tanks are connected by a water passage running from side to side of the ship, there is a further connection at the upper part of the tanks to allow for the displacement of air from one tank to another in order to follow the displacement of the water, and the action of the tanks can be immediately stopped by closing the valve in the air connection between the two side tanks.

We have had an opportunity of examining the models at the offices of the Parsons Foreign Patents Co., Ltd., of 3, Dean Farrar Street, Westminster, London, S.W., and the effect of the rolling tanks is shown thereby in a most remarkable and conclusive manner.

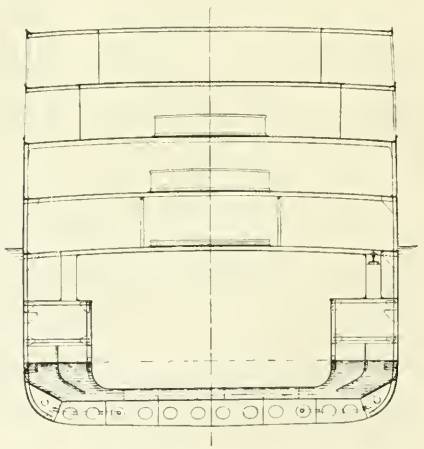


Fig 4. S.S. *General*.
Section of the Anti-Rolling Tank.

Industrial and Trade Notes.

THE CLYDE AND SCOTLAND.

(From our Own Correspondent.)

JULY being the holiday month in the shipbuilding and engineering establishments on Clydeside—those of the lower preceding those of the higher reaches in ceasing from labour for ten days or so—there is not the full monthly tale of doings and happenings to record. Nevertheless great activity marked the period preceding the stoppage in both the Glasgow and Greenock districts, and but for the difficulties which have been met with in securing delivery of materials the output of new shipping for July would have compared very favourably with that of previous months. Because of the difficulties referred to there was no desire on the part of the shipbuilding employers to restrict the period of holiday, but the steel works and foundries generally having so many of their orders greatly behind, were granted shorter holidays than the yards and engine shops. Very fortunately the weather all through the "Glasgow Fair" was extremely fine, and workmen with their wives and families resumed the ordinary round of things greatly invigorated. The volume of work on hand in Clyde establishments has probably never been greater than at this time. According to the returns recently issued by Lloyd's Register for the second quarter of the year the Glasgow district yards had on hand at the end of the quarter 105 vessels of 411,875 tons, as against 118 of 387,241 tons at the end of March, and 103 of 332,892 tons in June last year, and the corresponding figures for the Greenock district are 62 of 261,670 tons, against 65 of 262,331 tons and 58 of 241,770 tons. With improved delivery of material, therefore, and immunity from anything like serious labour troubles—although in this the element of uncertainty enters as largely as usual—there should be every prospect of 1912 becoming the record year for output. The output for the first half of the year did not quite fulfil expectations, the reduction as compared with last year being about 20,000 tons, and as compared with the record year (1906) almost 47,000 tons, but with the huge amount of tonnage on the stocks and books of Clyde firms and with five months to deal with it, it is to be hoped that the working forces of Clydeside industries will excel themselves. With the present congestion on the stocks there has not been anything like briskness in placing orders of late, but important orders are known to be materializing. What orders have been received will be found noted below.

Messrs. Yarrow & Co., Scotstoun, continue to be much in evidence on the favourite Clyde arena for the speed trials of fast torpedo destroyer and other like craft. On the Skelmorlie "measured mile" on June 25th they subjected to exhaustive trials the turbine yacht *Winchester*, built for Mr. P. W. Rouss, New York. As the mean of a number of runs over the mile the vessel attained a mean speed of 32¾ knots, which is a quarter of a knot in excess of the contract speed. The trials prove that this smart-looking vessel, conceived somewhat on the lines of a torpedo destroyer, and 205 ft. in length by 18 ft. 6 in. beam, is one of the fastest yachts afloat. The propelling machinery consists of Parsons turbines driving two shafts, steam being supplied by two Yarrow water-tube boilers fired with oil fuel. At Skelmorlie, also, on June 20th Messrs. Yarrow & Co. had a successful official full-speed trial of H.M.S. *Firedrake*, one of the three special destroyers ordered from the firm by the Admiralty last year. During a continuous run of eight hours the vessel attained a mean speed of 33 knots, this exceeding the contract speed of 32 knots by 1·17 knots. The vessel is 255 ft. long by 25 ft. 7 in. beam and is propelled by Parsons turbines driving two shafts, steam being supplied by three Yarrow water-tube boilers fitted with the firm's latest feed-heating devices.

Messrs. William Beardmore & Co., Dalmuir, on July 9th and 10th, subjected to progressive and full-speed trials on the Firth of Clyde the two-screw steamer *Warilda*, the first of three similar vessels the firm have on hand for the Adelaide Steamship Company of South Australia. The vessels have been specially designed for a fast passenger service round the coast of Australia. The propelling machinery consists of two sets of quadruple-expansion engines, designed to give a speed of 15 knots. Although the weather was not favourable for the best results, the trials were carried out with marked success. The *Warilda* returned to Dalmuir, where her machinery was examined and the steamer prepared for her voyage to Australia. The firm have also again in their fitting-out basin the super-Dreadnought *Conqueror*, which, as noted in last issue, left the Clyde for Devonport on May 22nd to undergo her official trials. She returned to the Clyde on June 21st, having completed all her official trials most successfully, attaining a record mean speed of over 22 knots—one knot above the estimate. Since her return to her builders' basin the machinery has been opened out and examined in accordance with Admiralty practice and she will leave shortly, practically ready for commission.

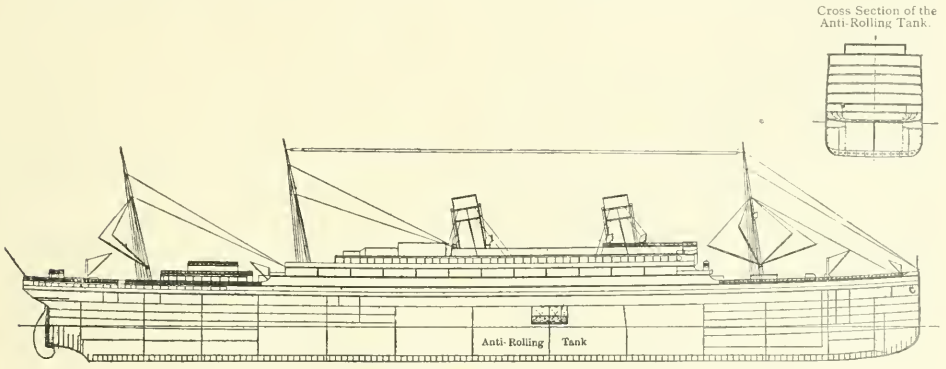


Fig. 6.—Showing relative size of tank to the vessel.

Messrs. Ferguson Bros., Port Glasgow, have received from the Clyde Lighthouse Trustees an order for a large bucket dredger, which will be used in deepening the channel of the Clyde within the jurisdiction of the Lighthouses Trustees, in accordance with the powers obtained under their recent provisional order.

Messrs. William Hamilton & Co., Port Glasgow, on July 6th had the satisfaction of seeing the large new floating dock *Soerabaja I.*, built by them for the Droogdok Maatschappij Soerabaja, Amsterdam, taken in tow for her destination at Java. The dock was completed for her voyage at the Victoria Harbour, Greenock, where she was taken after examination in the graving dock at Govan. A large steel pontoon, brought

...ually to an Amsterdam, has been used in conjunction with the dock and in which sleeping accommodation for the men engaged in the work of transhipment was fitted into the dock for the voyage.

Messrs. John Cran & Co., Leith, who launched on July 15th a screw tug steamer built to the order of Messrs. C. A. Stewart and Co., London, for service at Archangel, have also recently completed the *Inniska*, the second of the fleet of eighteen motor coasting vessels which are being built to the order of the Coasting Motor Shipping Co., Ltd., Glasgow. On June 28th, the vessel and her machinery was inspected by a number of gentlemen from various parts of the country. The other vessels of the fleet are being constructed by various shipbuilders on the Clyde and the Forth. The first of the fleet to be launched, the *Inniskga*, built at Kirkintilloch, by Messrs. Peter McGregor & Sons, was handed over to her owners early in June, and is now in service; and two other similar vessels, the *Innisbeg* and *Inniscoone*, have since been launched, and are now being completed for trial. The feature of all the vessels of the fleet, which range in size from 140 tons to 370 tons carrying capacity, is that steam power is entirely dispensed with, and internal combustion engines of from 90 to 160 brake horse power and of various types adopted. The three vessels mentioned as having been built by Messrs. P. McGregor & Sons are 67 ft. long and of 140 tons deadweight capacity and are fitted with Bolinder oil engines. The *Inniska* just completed by Messrs. J. Cran & Co. is larger than the Kirkintilloch-built vessels, being 93 ft. in length and having Bolinder engine of 120 b.h.p. Messrs. Cran have also in hand a large vessel of similar design for the same owners.

Messrs. Ramage & Fergusson, Leith, have received an order from Messrs. George V. Turnbull & Co., Leith, for a steamer of about 1,400 tons deadweight for the Spanish trade.

Messrs. MacKay Brothers, shipbuilders, Alloa, who have at present three steamers on the "stocks," have recently been successful in securing a contract to build an oil-carrying steamer of about 5,000 tons for American owners.

Messrs. The Caledon Shipbuilding and Engineering Co., Dundee, who about mid-July launched a steamer 321 ft. long and 3,100 tons gross for Messrs. Yeoward Brothers, Liverpool, for trade between this country and the Canary Islands—the seventh built by the firm for the same owners—are now exceptionally well employed. In addition to the 4,000-ton steamer ordered by the Leyland Line—as noted in last issue—the Company have on hand, or to begin, a 340-ft. oil-tank oil-engined vessel of 5,100 tons deadweight for the Anglo-Saxon Petroleum Co., London, to be propelled by twin sets of Diesel oil engines, an oil-tank steamer with a length of 310 ft. for Messrs. Lane & McAndrew, London, a 250-ft. Lake steamer for the Anglo-American Oil Co., and three 250-ft. vessels for Messrs. Nicholas Mihanovitch for River Plate service.

TYNESIDE AND WEARSIDE.

(*From our Own Correspondent.*)

Tyneside.

THE shipbuilding yards and engineering works in this district continue to be very busy, and with the Naval manœuvres now taking place with the Tyne as base, it has revived the rumour that the Admiralty intend to have a naval base on the Tyne, which is giving great satisfaction here, as it would do a lot of good to the shipbuilding and kindred industries on the river.

Messrs. Armstrong, Whitworth & Co., Ltd., are still very busy, and are working at full pressure at both the Elswick and the Walker yards. The extensions to the latter yard will soon be completed, which will enable the firm to build the largest size battleships at this yard.

Messrs. Swan, Hunter & Wigham Richardson, Ltd., continue full of work in all departments, both new and repair, and have in hand repairs to some of the destroyers belonging to the Blue Fleet, which have been injured during the manœuvres on the North-east coast.

Messrs. Palmers' Shipbuilding and Iron Co., Ltd., have still sufficient work in hand to last them a considerable time. The work on the cruiser *Queen Mary* is going on satisfactorily. This ship, when finished, will be the largest cruiser in the British Navy. The firm are also engaged repairing one of the destroyers injured in collision during the manœuvres.

Messrs. Smith's Dock Company, Ltd., have a great deal of work in hand, both at the docks and alongside the quays, repair work being brisk at this firm's graving docks.

Messrs. Joseph T. Eltringham & Company have a considerable amount of work on hand, both new work and repair work, all the berths being occupied, and dry docks also.

Wearside.

Work is still very brisk on the river, the engineering and shipbuilding firms being fully employed.

Messrs. William Doxford & Sons, Ltd., have in hand a large quantity of work, amongst which are two 15,000-ton oil-tank steamers for the Eagle Transport Co., and several 11,000-ton special ore-carrying steamers with large water ballast capacity. They are also building an 8,000-ton vessel with geared turbines, and have in hand a special bunkering craft for bunkering liners through their side ports automatically. The Company has been experimenting for a considerable time past on marine oil engines of the Diesel type. The engine is now completed, and has emerged successfully from the trial runs. To establish its reliability the engine is to be put through a night and day run lasting for a month. The engine, which is quite open, with all parts easily accessible, has been entirely designed and constructed in England.

Messrs. George Clark, Ltd., are working night and day on engines being built on the river.

Messrs. S. P. Austin & Son, Ltd.—This Company is now laying the ways for launching a collier steamer of 3,000 tons carrying capacity at the end of the month, for London owners, and the berth will be taken up by a similar vessel, also intended for the coal trade. The machinery for these vessels will be obtained from makers on the Wear. The deliveries of new material from the steel works are still most unsatisfactory, and have caused a good deal of disappointment and stoppage to the men, otherwise this yard would have been more busily engaged on the two large collier steamers now on the stocks. The ship-repairing branch of this Company has had a fair number of vessels under repair during the month, including repairs to bottom plating of a local steamer consequent on grounding in a fog. There is also in the dry dock the steel sailing barque *Frank*, which was built by the same Company in 1888, and is now being put through her special classification survey repairs; it is seldom now that a large sailing vessel is seen in dry dock at this port. A locally-owned steamer is also due at the yard for passing her No. 1 Lloyd's Survey, but generally the repairing trade is quiet at the moment, owing to the profitable employment of all vessels at this time, and owners are unwilling to stop them unless for urgent repair work.

Messrs. MacColl & Pollock, Ltd., have just completed the shipment of the machinery of the s.s. *Sheaf Arrow*, built under the Ayre-Ballard patent by the Blyth Shipbuilding and Dry Docks Co., Ltd., to the order of Messrs. Souter & Co., of Newcastle. Machinery has also been shipped to Antwerp for the s.s. *Beechtree*, built at that port by the Antwerp Engineering Co., for Messrs. Howard, Jones & King, of Cardiff. Machinery is now being shipped at Sunderland in the s.s. *Nestor*, built by Messrs. MacKay Bros., of Alloa, for the Neptune Line, Bremen, this being the fifth ship engined by Messrs. MacColl & Pollock, Ltd., for that firm. They have also under construction the machinery for another vessel building at Alloa, for three other ships building at Antwerp, and a ship building at Middlesbrough for South Coast owners, as well as a large amount of repair and additional boiler work.

Messrs. Osbourne, Graham & Co. have just sent on her trial trip the s.s. *Nervion* built for Messrs. Fearnley & Eger, of Christiania. This vessel is constructed on the Monitor patent system, and is the first foreign-owned vessel built on this principle. On her trial, in rather rough weather, she attained a speed of 9½ knots loaded, and by her behaviour gave great satisfaction to all concerned. They expect to launch a sister vessel at the end of this or the beginning of next month.

Messrs. John Dickinson & Sons, Ltd., are very busy, and amongst other work are busy with a set of engines for a ship building at Sir James Laing & Sons, Ltd. They have also a large amount of repair work on hand.

THE TEES AND HARTLEPOOLS.

(From our own Correspondent.)

Middlesbrough.

Messrs. Sir Raylton Dixon & Co., Cleveland Dockyard, continue to be very busy, having a large amount of work on hand. Amongst recent orders is a small steamer of about 2,500 tons deadweight for the Denaby and Cadeby Main Colliery Co., and to have machinery fitted by Messrs. G. Clark & Sons, Southwick, Sunderland. They are also reported to have secured the contract to build a large oil steamer of about 8,000 tons deadweight for the Anglo-American Oil Co.

Messrs. Smith's Dry Dock Co., South Bank, have numerous orders on their books and are reported to have placed several orders for machinery with other firms. They are fully occupied in dry dock and repair work.

Messrs. W. Harkess & Son, Ltd., are reported as expecting to secure the order for a medium-sized cargo boat that is in the market; they are also busy with repair work.

Messrs. Richardsons, Westgarth & Co. continue to be very busy. The Diesel-engined steamship *Eveston* has been turned in the dock with very satisfactory results, and ere this goes to press will have undergone her trials. Work is very brisk in the speciality department.

Stockton and Thornaby.

Messrs. Richardson, Duck & Co. are reported to have secured the contract to build a medium-sized cargo steamer.

Messrs. Craig, Taylor & Co. are very busy. They have secured the contract to build a large oil steamer, a sister ship to one to be built by Messrs. Sir Raylton Dixon & Co., also for the Anglo-American Oil Co., Ltd.

Messrs. R. Ropner & Son are offering several of their fleet for sale; all the vessels are in very good condition. They are expecting an order for a cargo steamer that is in the market.

Messrs. Blair & Co. have a large amount of work on hand, several new orders have just come to hand, one for Messrs. Pyman, of West Hartlepool. The steamer is building by Messrs. Irvine's Shipbuilding and Dry Dock Co.

West Hartlepool.

Several steamers owned locally have changed hands. The s.s. *Harlingen*, 938 gross tons, 1,550 tons deadweight, belonging to Messrs. Furniss, Withy & Co., has been sold to Germans for about £15,500. The s.s. *Annapa*, 3,541 gross tons, sold to Eastern clients through C. J. Ashdown & Co., for about £17,500. The s.s. *Alleghanny*, 4,262 gross tons, to Japanese buyers for about £32,000, lately owned by Messrs. Furness, Withy & Co. The s.s. *Largo Bay*, 2,026 gross tons, owned by Messrs. Crosby, Magee & Co., sold to the White Star Line through Messrs. H. Moss & Co.

Messrs. W. Gray & Co. are very busy at both yards. They are reported as having booked another order for a medium-sized cargo steamer for Messrs. Strick & Co. They have, however, great difficulty in getting plates from the mills, which is very severely handicapping work.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Harbour Dockyard, are very busy; they have on hand nearly the largest steamer ever built at this yard, and are also reported as having secured a repeat order for a small cargo steamer.

Hartlepool.

The Central Marine Engine Works of Messrs. W. Gray and Co. have a great deal of work in hand and in the stamping department orders are being refused except for very late delivery next year. They have to supply all the machinery for the new orders at the shipyards.

Messrs. Richardsons, Westgarth & Co. are very busy; they are reported as having secured several orders for machinery for steamers building in France, and have a large amount of condensers and auxiliary work on hand, sufficient to keep them busy for over twelve months.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Middleton Yard, are busy with the large twin-screw meat boat for Messrs. Houlder Bros., a sister ship to the *El Paraguayo*.

A remarkable occurrence took place on Friday, July 19th, when the s.s. *Time*, which had been launched on the Thursday from Messrs. Priestman & Sons' yard on the Wear, went ashore on Longscar Rocks at West Hartlepool, the tugs being unable to handle her owing to the severe gale. During the night she floated off the rocks for about a mile past Seaton Carew, where she lies high and dry on the sands.

THE HUMBER AND DISTRICT.

(From our Own Correspondent.)

Hull and Indian Trade.—The Hon. F. H. Stewart, C.I.E., one of the delegates from India to the International Congress of Commerce and Shipping, held in London, paid a visit of inspection to the port of Hull with a view to further extending the trade relationships between our great Eastern dependency and Hull. Accompanied by a distinguished party Mr. Stewart made a tour of the Western Docks and the riverside quay. Mr. Stewart exhibited great interest in the cold storage equipment and the fish dock. Passing to the east end of the city, the Victoria Dock and its enormous storage of timber came under notice. The Alexandra Dock of the Hull and Barnsley Railway Company was next inspected, this dock presenting a very busy spectacle, several large grain vessels from the East, including the Wilson liner s.s. *Toronto*, from Bombay, were discharging great numbers of bags of grain and seed. The new joint dock under construction was next visited, a tour was made of all the workings, keen interest being evinced in the magnificent entrance and the work of placing the iron gates in position. The excavating for the additional arm recently determined upon is going on apace, and when the water is let into the dock, as it will be next year, Hull will be in possession of a deep water dock of 53 acres in extent, and by far the largest on the north-east coast. Provision has been made for future extensions, so that ultimately the total water area will be increased to about 85 acres; without such extension it will be 8 acres larger than the new dock at Immingham. The coaling appliances will enable a steamer to coal at the rate of 1,000 tons per hour, whereas the capacity of Immingham is 700 tons per hour. Mr. Stewart expressed himself delighted with his visit.

The Hull Coal Trade.—The total quantity of coal received in Hull from all sources during the first six months of the current year was 2,997,824 tons, which, compared with the total for the corresponding period of 1911 of 3,088,032 tons, shows a decrease of 90,208 tons. The exports abroad during the past half-year show a decline of 257,870 tons—the East Indies, Germany, Portugal, Russia, Spain and Norway being the only countries taking increased supplies. A decrease is also shown in the coastwise shipments of 59,741 tons. This decline in the coal trade of the port is accounted for by the stoppage of work at the various collieries during the miners' strike, and again during the progress of the unrest in London. The trade improved during the month of July. The appliances at the various docks have been fully occupied and the present prospect is much more satisfactory. From now to the end of the Baltic season there is no doubt that a largely increased volume of trade will open out and a good business will be done.

Trade at New Dock, Immingham.—Thus far the new dock at Immingham has had a far greater effect upon the coal shipments of Grimsby than upon those of Hull. Last week, for the second time, more coal was exported from Immingham than from Grimsby, which at the same time suffered a reduction by nearly half as compared with the corresponding week of last year. Hull shipments have been only very slightly affected by the completion of Immingham.

Tourist Season.—The steamship owners in the short Continental trades are very busy with passengers. One Company has had to charter the Channel steamer *Duke of Connaught*, which has accommodation for 250 saloon passengers, and runs between Hull and Rotterdam for the Hull and Netherland Steamship Company. This Company find it often necessary to sail two steamers daily. The Wilson line steamers running to Norway and Sweden are receiving

a great amount of patronage this season in the passenger way.

Record Coal Loading.—The s.s. *Cuxhaven* of Flensburg, has been loaded in the Albert Dock of the North Eastern Railway Company at a record speed. She took on board 3,500 tons of coal at an average speed of 400 tons per hour. When trimming was not necessary the speed was 600 tons per hour. The coal was put on board by a single appliance working to one hold at a time. This is another instance of the wonderful despatch that can be done with the modern appliances erected by the North Eastern Railway Company at the Hull Docks. The coal was shipped by Messrs. D. M. Stevenson & Co. of Hull and Glasgow.

Messrs. Earle's Shipbuilding and Engineering Co., Ltd., have been successful in securing the building of two large steamers for Liverpool owners for the Eastern trade. They will be built to Lloyd's highest class. Several steamers for local owners are also in hand and the engine works are busy with repair and new work. The patent slips are fully employed sighting hulls, propeller work, etc.

Messrs. Cooper & Co., Ltd., engineers and ship repairers, have been very busy of late. They have had the s.s. *Ravenswing* in the graving dock with severe damage to bottom, and other repairs in engine room and deck. The branch shop has had a fair run of overhauling work on several steamers. The Company's graving dock for coasters, etc., has had a good month and is well booked up.

Messrs. Stewart & Craig, engineers and ship repairers, have had a fair run of work lately, and at present they are busily engaged on the sailing ship *Leyland Brothers*, which has been bought by the Empreza Nacional of Lisbon, and are altering her for hulk purposes.

Messrs. Amos & Smith, Ltd., engineers and boilermakers, have been successful in securing several sets of engines and boilers for trawlers for delivery early next year. The firm are still running the night shift to complete orders, the full complement of men being retained at the different machines. The branch at Alexandra Dock is keeping fairly busy with repair and graving-dock work on local and outside steamers.

North-East Coast Engineering Works, Ltd., have had a good month on the following steamers:—S.s. *Cluden*, s.s. *Haverstor*, s.s. *Bracemount*, s.s. *Trader*, s.s. *Bideford*, s.s. *Busiris* and s.s. *Holman Sutcliffe*. The s.s. *Cluden* has been in graving dock drawing tail shaft, changing propeller and sundry repairs to engines and deck; s.s. *Trader* changing the propeller and engine-room repairs; and *Holman Sutcliffe* has just completed heavy repairs in graving dock, new floors, frames, etc.

Messrs. C. D. Holmes & Co., Ltd., engineers and boilermakers, have booked several sets of machinery and boilers for trawlers and drifters for local and Grimsby owners. The machines at the shop are working at full pressure and the shop at Alexandra Dock is having a fairly busy share of repair work on several steamers. The outside staff is also busy fitting machinery into trawlers and preparing them for sea.

The Central Dry Dock Co. have several large jobs on at the present time, notably the s.s. *Bangor*, welding the stern frame by electric process. Repairs also on the following—s.s. *Ethelbrighta*, s.s. *Dulcie*, s.s. *Marchland*, s.s. *Ellerslie*, s.s. *Langoe*, s.s. *Gothic*, s.s. *Ormazan*, s.s. *Elizabeth*, s.s. *Peruvian*, etc., etc.

Charles Tate, engineer and boilermaker, has had a fair month on general coasters and tug boats.

Messrs. Woodall & Co., engineers and boilermakers, have had a good month on Swedish and Norwegian steamers, doing repairs to engines and deck departments. The smith's shop is fairly employed on forgings for railway companies.

Messrs. Cochrane & Son, shipbuilders, Selby, have been busy completing trawlers and drifters for local and other firms, and have booked orders sufficient to carry the firm well on to next year.

The Wilson Line.—This firm has given out orders for four new steamers to be built on the Clyde. The builders are Messrs. Dunlop, Bremner & Co., and the Clyde Shipbuilding Co., Port Glasgow.

Obituary.—There passed away on the 11th ult. Mr. James Leslie, a native of Glasgow, who joined the Wilson Line forty-seven years ago, first coming to Hull in the *Bravo* as second engineer. He has been many years sailing as chief engineer in the Wilson Line, in different trades, and was at one time ashore as assistant superintendent engineer. Mr. Leslie, who was seventy five years of age at the time of his death, was a man of genial character. He has left a widow and son to mourn his loss.

SOUTH OF ENGLAND AND ISLE OF WIGHT.

(*From our Own Correspondent.*)

Messrs. Day, Summers & Co., Ltd., Northam Ironworks, Southampton.—No important orders have been booked during the past month, but good progress is being made with all contracts, although some difficulty is experienced in obtaining delivery of material. See July issue for work in hand.

Messrs. J. I. Thornycroft & Co., Ltd., Southampton.—H.M. ships *Hardy*, *Paragon*, *Porpoise*, *Unity* and *Victor*.—Satisfactory progress has been made on all these destroyers during the past month. The keels for the two shallow draught ferry steamers for the Port Commissioners for Calcutta will be laid about the beginning of this month. Diesel engined yacht.—The shell plating is erected and being riveted. Passenger and cargo steamer for Trinidad.—The firm have received an order from the Crown Agents for the Colonies for a twin-screw tunnel passenger and cargo steamer of 180 ft. length for service at Trinidad, similar in many respects to the steamship *Naparima*, which they built for the same service some years ago. Motor passenger vessel for New Zealand.—The Northern Steamship Co. of Auckland, New Zealand, have placed an order for a shallow draught motor passenger steamer, and the keel will be laid shortly. In addition to sundry launches a considerable amount of general work has gone through the shops. The repairs department has been well occupied on H.M.S. *Egerton*, s.s. *Avondale Castle* and troopships *Rohilla* and *Rewa*.

Messrs. J. Samuel White & Co., Ltd., East Cowes, Isle of Wight.—The survey of s.y. *Luna* was completed last month and the vessel left the port. Three steam pinnaces successfully completed official trials and will shortly be despatched to Boston, Mass. The firm have booked orders for the construction of two motor-driven hospital launches for the Admiralty during last month, and work in all departments continues brisk.

THAMES.

(*From our Own Correspondent.*)

The Dock Strike.—When we announced last month that the strike was practically ended we were correct in the sense that large numbers of men had returned to work, and the funds of the Union were very much depleted, but since then a loan is said to have been obtained from other unions and hence the struggle goes on. There is no freedom of labour whatever, shots have been fired and the military called out to protect those employed. The situation is altogether a deplorable one and nobody stands to gain by the present position of affairs. The employers stand firm in their determination to retain the services of those men who have stood by them and not to meet the leaders of the unions. Intimidation prevails and some works are partly shut down in consequence of not being able to obtain their consignments by water. Meanwhile the state of affairs being so serious the ceremony of cutting the first sod of the new dock on the river, which the King was to inaugurate, had to be abandoned by the Government and money which would have been spent on the occasion has thus been entirely lost to the trading classes. Meanwhile, the last returns show 17,417 men employed at the docks, so this implies that the unions have not matters in their own hands in any way. As regards the lightermen monopoly, the Port of London Authority has taken steps to abrogate this, but it will take a few months if passed to get into working order owing to the formalities that have to be gone through. The employers present a united front for free labour and no recognition of the Union, and it would seem, if the organization of the Port is to be carried on efficiently, this position must be upheld.

Shipping Companies.—It is understood the Union Castle Co., under its new management, has come to a complete agreement with the South African Government as regards the mail and freight contracts. This will likely lead to bigger and faster ships being employed on the service and the sixteen days' trip to be shortened. The British India Steam Navigation Co. has come into the market with an issue of £1,000,000 4½ per cent. debenture stock, and there are rumours that this Company propose acquiring the line of steamers owned by the Indo-China Steam Navigation Co., which has a fleet of thirty-eight steamers trading in the China seas, but none of very large dimensions. With the Companies working in conjunction the China revolutions seriously affected the trade and a further effect has probably resulted from the Japanese embarking in the Calcutta shipping business. The necessity of a strong combination to meet these conditions is therefore clear, and it remains to be seen if the rumour has a substantial foundation or not. Judgment has been given in the case of the loss of the Oceana last March in the English Channel by collision with a German barque. The chief officer was held to blame and his certificate suspended for six months.

Cold Storage at the Docks.—A large scheme has been inaugurated by the Port of London Authority for additional cold storage accommodation at the Albert Docks to cost £275,000, and making the installations, it is said, the leading one in the United Kingdom. Conveyers will be used for discharging from the ships' holds into three docking sheds, so that there will be little or no handling of the carcases, which tends to depreciate their value. Exposure will thus be reduced to a minimum and the discharge of the vessels accelerated.

The Medway Floating Dock.—This structure has arrived in the Medway for service and weighs no less than 12,000 tons without machinery and equipments, and is 680 ft. long and 144 ft. wide. The height of the dock walls is 60 ft., and a lifting capacity is provided of 32,000 tons. The details are of the very latest character and it is expected a battleship will shortly undergo her refit in this floating dock, which is moored in Saltpan Reach.

The Port of London Authority's New Offices.—Plans have been determined upon for the new buildings to house this body and its staff in Trinity Square, and these will be exhibited at the river offices of the Authority up till July 30th.

MERSEY AND MANCHESTER SHIP CANAL.

(*From our Own Correspondent.*)

STEADY activity prevails throughout the Mersey district, at present all the sections being busily employed. Admiralty work keeps a large number employed, while the new Gladstone Dock is also finding work for many labourers and others.

Messrs. Cammell, Laird & Co.—While there has been no new work placed, enquiries have been fairly numerous and the large amount of Admiralty work on hand is being rapidly brought near completion. The Australian cruiser *Melbourne* has now all her machinery on board. H.M.S. *Audacious* is now receiving her coats of paint and should be ready for launching during the current month. The large floating dock is also expected to be towed south during the month. The L. & N.W. Railway boat *Greenore* ran a successful sea trial on July 23rd, and is expected to take her place on the service early in August. With her two funnels and fine lines she has a smart appearance, and should make a valuable addition to the Greenore-Holyhead service. The Pacific Steam Navigation Co.'s meat barge *Dart* is expected to be launched the first week in August at the Birkenhead yard. The steamers *Duke of Lancaster* and *York* took their place on the service of the Isle of Man Co. about the middle of July, after extensive repairs at this firm's hands. The repair department have been busily employed. The Isle of Man Co.'s steamer *Empress Queen* has had repairs carried out at the West Float Graving Dock, while in the firm's own docks the *Kelvinbank*, *Rena*, *Hesione* and *Dunstan* steamers have been in hand. At the Alexandria Dock, Liverpool, the s.s. *Japan* has been repaired.

New Liverpool Shipbuilding Enterprise.—An interesting item of news in the shipbuilding world is that the yard at Londonderry is to be restarted by Liverpool gentlemen. The first vessels to be built will be laid down within four months, several orders being in hand. There are four berths now existing and it needs be another twelve acres of land will be added later on. £10,000 will be spent at once in equipping the yard. Mr. J. W. Wiles, shipyard manager for Messrs. John Blumer and Co., Sunderland, has been appointed to a similar position with the North of Ireland Shipbuilding Co.

Messrs. H. & C. Grayson.—This firm have had all their yards fully employed with their usual class of work. At their North End Works the steamers *Lincolnshire*, *Mobile* and *Mongolia* have been in for general repairs. The steamer *Rhoda* has been berthed for extensive repairs. At the Birkenhead works they have completed repairs to the s.s. *E. K. Muspratt*, including the installing of motor power. A number of barges and small craft are in hand for home and foreign use.

The Cunard Line.—It is understood that the *Mauretania* has recently tested the use of a new device for the detection of ice at sea. The apparatus is the invention of Mr. C. McNab, the well-known engineer. The principle is such that slight changes in either sea or air temperatures are registered, alarm lamps are lighted and gongs rung, thus giving the officer ample warning of any changes. The *Franconia* spoke the convict ship *Success* on her last homeward passage, this being the third time that she has spoken this vessel while on a voyage from Queenstown to New York. She had been sixty-six days out when spoken and had been on her beam ends with heavy weather, the yards having touched the water. Following upon the many honours conferred upon Captain Arthur Henry Rostron, R.D., R.N.R., the gold medal and framed resolution of the Liverpool Shipwreck and Humane Society was presented to Captain Rostron by the Lord Mayor at the Town Hall. It may be remarked that by this act Captain Rostron was instrumental in saving 705 survivors of the loss of the *Titanic*.

The Allan Line.—The names of the two new 17,000-ton steamers now building on the Clyde for the Allan Line are to be the *Calgarian* and *Alsatian*. The cooking utensils for the galleys on these vessels are to be of pure solid nickel and are being supplied by the Berndorf Metal Works.

The Engine-Room Heroes' Memorial.—A meeting of the committee for the above was held in the Town Hall, Liverpool on the 26th ult. Lord Derby presided as president and amongst those present were Sir Wm. Lever, Mr. Arthur Maginnis, and representatives of the White Star, Cunard and other lines, etc. It was moved that the funds in hand and to be received be devoted to erecting in Liverpool a memorial to the thirty-three engineers who so nobly gave their lives in the cause of duty. Over £2,000 had thus been subscribed to this fund, but it was expected that months would elapse before all the contributions could arrive.

NORTH-WEST OF ENGLAND.

(*From our Own Correspondent.*)

Barrow-in-Furness.—The past month has been one of unexampled activity in the shipbuilding and engineering trades. No new orders have been reported, but brisk attention has been centred on the orders in hand, and all the more so because there are indications of a much busier time in the near future. Messrs. Vickers, Ltd., are in the market for some new and important business, and their resources of output are so complete that if they want to secure orders they are in a position to get them by reason of the economic and up-to-date means of production. They have recently made a large addition to their engineering shops, and now a further addition has been rendered necessary with a view of housing new tools which the growth of business requires, and which the need of acquiring the best machinery possible necessitates. Other new features of extension have been agreed upon, and still others are in prospect. The feature of the development of Messrs. Vickers' business in Barrow has always been the capital available for any improvements the directors have considered essential in order that the firm might have at command the most up-to-date appliances in the several branches of their operations.

The "Princess Royal."—The work of completing the British battle-cruiser *Princess Royal* is proceeding very satisfactorily.

The gigantic vessel would have been delivered to the Admiralty long enough ago had it not been for the alterations in her design rendered necessary after the trials of her sister ship the *Lion*. The changes introduced into the *Lion* are being made in the *Princess Royal* and it has been arranged that she is to leave Barrow in the middle of August for her trials. Her two tripod masts have been replaced with ordinary pole masts and the foremast has been removed further forward so as to free the navigating bridge from the intense heat which was thrown out her foremost funnel. The latter has been made considerably longer. The changes make the ship look quite a different class of vessel. The *Lion* on her trials after alteration worked very satisfactorily, and it is expected the *Princess Royal* will prove an equally good ship.

H.I.J.M.S. "Kongo."—This monster vessel, which is lying under the 200-ton crane, at the Buccleuch Dock fitting-up wharf is employing several hundreds of men in her various departments. Her engines and boilers have been put aboard, and she carries now some of her heaviest weights, with the exception of her gun and gun mountings, which will be fixed later on. The ship has to be delivered in two years from the time at which her keel was laid, and up to now good progress has been made in the work. Some delays have occurred owing to labour difficulties and the scarcity of men in several of the trades, but efforts are being made to overcome these set-backs. The Vickers' firm have an opening for another thousand men in their various departments, and they are doing all they can to secure these men. The difficulty arises chiefly because there is a big demand for shipbuilders and engineers throughout the country, and those who are busiest are doing all they can to keep hold of their men. Several groups of men are coming to hand every week, and efforts are being made to secure houses for them. There is in Barrow at present the immediate need of another thousand workmen's dwellings. The building trade is therefore very busy at present, and is likely to continue so for some time to come. Barrow in its history has made great increases from time to time in its population by reason of sudden developments in trade. This is another period of expansion, and it is believed to be one of a permanent character, as the Vickers' Company has made arrangements for a big programme of work even in times when orders may be scarce.

Reshad V.—The Turkish super-Dreadnought *Reshad V.* is beginning to rear her frames. Quite an army of men are employed in her construction, and no time is being lost in the work, as she has to be delivered in twenty-two months from the date of laying her keel. Quite a number of Turks are in Barrow inspecting the work of construction.

H.M.S. "Delhi."—Although the keel of H.M.S. *Delhi*, a super-Dreadnought, was only laid in June, much work has already been done, and in the course of a short time an additional strength of members of the black squad will be employed on her.

"The Duke of Connaught."—This is the name given to the Montreal floating dock launched at Barrow on the 15th, 16th and 17th July. She will be at once riveted up by the joining of her three sections and will then proceed to Montreal before the river St. Lawrence is ice-bound. There is some talk about building another monster floating dock at Barrow, but nothing is known as to what country it is for.

Submarines.—Very great attention is being devoted to submarine construction at Barrow, as further orders are expected shortly for the British Admiralty.

The Steel Trade.—Very great activity prevails in the steel trade, and shipbuilding material, especially, is in good demand. Prices run at £7 17s. 6d. to £8 for ship-plates less 2½ per cent. at a month.

The Hæmatite Trade.—There is a great boom in the hæmatite iron trade. Makers are well placed with orders and prices are higher at 77s. 6d. for makers' iron nett f.o.b. and 75s. warrant sellers cash.

BELFAST.

(From our Own Correspondent.)

Messrs. Harland & Wolff.—Operations continue in full swing in both the north and south yards of the Queen's Island, all the building slips being occupied. Important orders continue to be booked, there being sufficient work in hand to ensure continuous employment for the full complement of hands for several years to come. Some little time since Messrs. Harland & Wolff were credited with contemplating the establishment of a shipyard at Brest, but the rumour lacked confirmation, and was generally discredited in Belfast. On 29th June they launched the fifth of the new twin-screw steamers for the Royal Mail Steam Packet Company's intermediate service to South America. Descriptions of the sister ships have already appeared in previous issues of "The Marine Engineer."

Messrs. Workman, Clark & Co. have also a large volume of work in hand, and the close of the year should find them with a good output to their credit. They have at present a considerable amount of new tonnage at the fitting-out wharves, and several vessels approaching the launching stage. Repair work has not been very brisk since the completion of the extensive bottom damage repairs carried out by them on the Ellerman liner *City of Lahore*, but they are said to have two big jobs arriving in the port shortly.

Messrs. MacColl & Co. are building the engines for a coasting steamer under construction in Dublin for Sligo owners.

New Railway Steamer.—The new paddle steamer, *Erin's Isle*, built by Messrs. A. & J. Inglis, Ltd., to the order of the Belfast and County Down Railway Co., has taken up her station on the Company's summer service between Belfast and Bangor. Judging by the large numbers of passengers carried every day, this new pleasure steamer has already proved herself very popular. She is 225 ft. long, with a beam of 29 ft. and depth 9 ft., a spacious promenade deck being carried the full length of the vessel. The propelling machinery consists of compound diagonal engines, steam being supplied by a large double-ended boiler having six furnaces.

Shipbuilding in Londonderry.—At various times prospects of the Derry shipyard being reopened have appeared bright, but hitherto the negotiations have always fallen through. Now, however, the revival of shipbuilding on the Foyle is an accomplished fact. The Company which has leased the yard from the Harbour Commissioners is to be known as the North of Ireland Shipbuilding Co., and Messrs. Trevisa Clarke, Liverpool, J. Weir-Johnstone, Derry, and John Esplen, Liverpool, are the first directors. The Company is receiving strong financial backing from the East Coast of England. The equipped portion of the yard is only five acres in extent, but the entire area covers seventeen acres, and there is no doubt that shipbuilding will be carried on on a more extensive scale than hitherto.

MR. R. R. BEVIS, of Messrs. Cammell, Laird & Co., Ltd., Birkenhead, and Mr. Henry B. Wortley, of Messrs. Alfred Holt & Co., Liverpool, have joined the Liverpool Board of the British Corporation.

INSTITUTE OF MARINE ENGINEERS.—On July 20th members of the Institute paid a very enjoyable and interesting visit to the Instrument Galleries and Circulation Department of the General Post Office.

NEW GRAVING DOCK, BELFAST.—At the Belfast meeting of the Institute of Mechanical Engineers held on the 30th and 31st July, Mr. W. Redfern Kelly read a paper on the "New graving dock and its mechanical plant and general appliances."

MESSRS. WILLIAM MCGEOCH & CO., LTD., have now transferred their branch business at Sunderland from that town to 30, Cloth Market, Newcastle-on-Tyne. Mr. Philip Lodwidge, who has represented them in the Newcastle district for many years, has now retired from business. The new branch is under the management of Mr. R. W. Waddle, who has assisted Mr. Lodwidge for some time past.

MESSRS. RICHARDSONS, WESTGARTH & CO., LTD.—CHANGE OF MANAGEMENT.—Mr. Tom Westgarth, of Middlesbrough, the joint managing director of Messrs. Richardsons, Westgarth & Co., Ltd., has resigned his position, but will retain a seat on the board. Mr. D. B. Morison, who will now be sole managing director of the Company, has appointed Mr. E. Hall-Brown to be general manager of the Middlesbrough works. Mr. Hall-Brown is well known in marine engineering circles and is at present president of the Institution of Engineers and Shipbuilders in Scotland.

TRADE NOTES.

Messrs. Ronald Trist & Co., Ltd.—We have received from Messrs. Ronald Trist & Co., Ltd., of "Sea Ring" fame, a small booklet on a new product which has been in the process of development for the past two years. It is a cup or plunger packing ring, designed on the same principle as the well-known "Sea Rings" gland packing, and is made specially for all classes of cylinder work, single-ended hydraulic rams, double-ended pump buckets or as a substitute for cup or hat leathers. The material used is the same as that from which "Sea Rings" packing is made, and is capable of withstanding 500 deg. Fahr. without the slightest deterioration taking place.

The Stern Sonneborn Oil Co., Ltd.—We have received a pamphlet on a patent oil-testing machine sold by the Stern Sonneborn Oil Co., Ltd., of Royal London House, Finsbury Square, London, E.C. This machine is designed to test the comparative values of lubricating and cylinder oils and greases under actual working conditions at the actual temperature and pressure the lubricants are subjected to in practical use. The range of the machine is considerable, as its speed variation is from 50 to 3,000 revolutions per minute, or in terms of the speed of frictional surfaces from 5 inches to 25 ft. per second, while the pressure can be varied from 1 lb. to 750 lbs. per square inch, and the temperature can be raised to about 850 deg. F. This latter is more than the equivalent of the temperature of dry steam under the highest practical working pressures.

Messrs. W. Briggs & Sons, Ltd., the well-known Dundee firm, have removed their head office to new and more commodious premises at Meadowside, Dundee. The latest pamphlet issued by them, entitled "Concerning corrosion," gives illustrated examples as to the application of their bituminous solutions and enamels to various classes of structures. With their extensive works and modern plant Messrs. Briggs & Sons are able to deal with the largest orders for the protection of iron and steel from corrosion and masonry and brickwork from the penetration of moisture.

Messrs. Siemens Bros., Dynamo Works, London, have issued a booklet on their "G 5" Watthour meters for direct or alternating current. This meter is fully described and illustrated and the pamphlet shows clearly how the renewal of the parts is carried out. All working parts can be replaced without tools, and the replacement of any or all parts does not necessitate recalibration.

Messrs. Simpson, Strickland & Co., Ltd., Dartmouth, have issued a descriptive list of standard heavy oil motors which they manufacture entirely at their works under licence from the Dutch manufacturers, Messrs. Steijaard & Jannette Walen, Rotterdam. The engine, which is of the two-cycle type, is fully illustrated and described in the pamphlet.

Messrs. W. H. Spencer & Co., Hitchen, have recently issued a list containing illustrations of the "Spencer-Hopwood water tube vertical boiler," taken from photographs of standard, squat, marine and launch pattern types. The list is an example of the varied use of these well-known boilers. A separate list deals exclusively with the Launch pattern, which shows its construction and accessibility.

Messrs. E. G. Appleby & Co., London, have sent us a pamphlet relating to the Kerpely Revolving Grate Gas Producer. Over 600 of these producers are at work in all parts of the world. The principle of construction is illustrated and described and a number of testimonials are printed in the book. It is claimed for the producer that it will save money on the fuel bill, completely gasify the fuel, remove the troubles with clinkering in brick-lined producers and automatically discharge the ashes.

Messrs. J. W. Brooke & Co., Ltd., Lowestoft. The latest catalogue issued by Messrs. Brooke & Co. on their industrial motors shows how these motors, which are being built in very large quantities, are adapted to all kinds of commercial purposes, including electric lighting and pumping, lifting machinery, driving organs and salvage work of all kinds. Petrol locomotives and railway inspection cars are also dealt with in the catalogue.

Joseph Dixon Crucible Co., New Jersey.—A pamphlet dealing with Dixon's graphite products, giving particulars and uses for all the well-known graphite specialities of the company. A separate booklet deals with Dixon's silica-graphite paint.

LAUNCHES AND TRIAL TRIPS.

LAUNCHES—English.

Betty.—On June 17th, Messrs. Wood, Skinner & Co., Ltd., of Bill Quay, Newcastle-on-Tyne, successfully launched from their shipbuilding yard a new steel screw steamer, which they have built to the order of Mr. Martin Carl, of Copenhagen. The vessel is of the single-deck type with poop, long bridge and topgallant forecastle and will be fitted with all the latest and improved appliances for facilitating the rapid loading and discharging of cargo. Water ballast is provided in the cellular double bottom all fore and aft (except under boilers) and also in the fore and after peak tanks. The saloon, captain's accommodation, etc., is arranged in a steel deck-house on the bridge deck, the officers and engineers being berthed in side-houses fitted on the after end of the bridge deck and the crew in the topgallant forecastle. The propelling machinery, which has been constructed and will be fitted by Messrs. North-Eastern Marine Engineering Co., Ltd., of Wallsend-on-Tyne, consists of a set of triple-expansion engines of improved design, supplied with steam by two large multitubular boilers working at a high pressure. Both the ship and engines have been built to the requirements and to the special survey of Lloyd's for their highest classification. When completed the steamer will be commanded by Captain H. C. Lagesen, who is also superintending her construction.

Shahristan.—On June 17th, Messrs. William Gray & Co., Ltd., launched the handsome steel screw steamer *Shahristan*, which they have built for Messrs. Frank C. Strick & Co., Ltd., of Swansea and London. The vessel will take the highest class in Lloyd's Register and is of the following dimensions, *viz.*:—Length overall, 412 ft. 6 in.; breadth, 53 ft. 6 in., and depth, 29 ft. 7½ in. She is a handsomely modelled vessel of the double deck type, with poop, long bridge and topgallant forecastle, having very tasteful cabin accommodation in houses on the bridge deck for passengers, captain and officers, and is fitted throughout with electric lighting. The vessel has a cellular double bottom and after peak tank for water ballast, and in addition there is a deep tank or hold compartment fitted for water ballast abaft the engine-room, giving a total capacity for water ballast of about 2,200 tons. The whole of the outfit, including steam windlass, steam steering gear, two derricks to lift 30 tons each, twelve steam winches with return exhaust to winch condenser of the contraflo type are of the most approved description. The machinery is made by the Central Marine Engine Works of the builders, being of the triple-expansion type with cylinders 28 in., 46 in., and 77 in. dia., with a piston stroke of 48 in. She is fitted with a contraflo main condenser, Weir's feed pumps and heater, and three large steel multitubular boilers working by Howden's forced draught at a pressure of 180 lbs. per square inch.

Ingolfur Arnarson.—On July 17th, there was launched from the yard of Messrs. Cochrane & Sons, Selby, a steel screw trawler, the principal dimensions being 135 ft. by 23 ft. 6 in. by 13 ft. 3 in. moulded. The vessel has been built to the order of Mr. P. J. Thorsteinsson, of Reykjavik, Iceland, and will be replete with all the latest improvements for the fishing trade. She will be fitted with powerful triple-expansion engines by Messrs. Amos & Smith, Ltd., of Hull. As the vessel left the ways she was gracefully christened *Ingolfur Arnarson* by Mrs. J. L. Richardson, of Hull.

Sheaf Arrow.—On June 18th, at the Blyth Shipbuilding and Dry Docks Co., Ltd., Blyth, the steamer *Sheaf Arrow* was launched. She has been built on the arch principle of construction, Ayre-Ballard patent, to the order of Messrs. W. A. Souter & Co., shipowners, Newcastle-on-Tyne, and has been designed and constructed from the plans and under the direction of Mr. Maxwell Ballard, and built to Lloyd's highest classification, her dimensions being as follows:—279 ft. between perpendiculars by 40 ft. 3½ in. extreme breadth, and she will carry about 3,100 tons on about 18 ft. 4 in. draught. She has a cargo poop and topgallant forecastle for the crew, with officers' accommodation amidships. Her machinery, by Messrs. MacColl & Pollock, Ltd., is 23½ in., 39 in., 64 in. and 42 in. stroke, with two boilers 16 ft. 6 in. by 11 ft., and she will be able to steam about 12 knots at sea. The vessel is intended to be the very latest and most up-to-date collier afloat, and is specially fitted for coaling the Fleet, and to satisfy Admiralty requirements, as well

West Point. On June 10th, Messrs. Irvine's Shipbuilding and Dry Docks Co., Ltd., launched from their Middleton Shipyard a handsomely modelled steel screw steamer *West Point*, built to the order of Messrs. Furness, Withy and Co., Ltd., for their Point Line, this being the third vessel recently built for the same Line. The vessel is of very fine lines, and the dimensions are 300 ft. by 50 ft. by 27 ft. depth moulded, carrying over 7,500 tons on a light draught. She is built to British Corporation classification, having three complete steel decks, with cellular double bottom and fore and after-peak tanks for water ballast. The vessel is constructed with deep sectional frames, and is divided into seven watertight compartments by means of six watertight bulkheads. Four large hatches are provided, and a cross bunker hatch amidships, with all the latest facilities for the rapid loading and discharging of cargo, including nine powerful steam winches, exhausting to a Contraflo winch condenser in the engine-room, and ten derricks; a powerful quick warping steam windlass is fitted forward, with steam-steering gear amidships and hand gear aft. A docking telegraph is also fitted. Electric light is installed throughout, including large clusters at each cargo hatch. The vessel is fitted with additional bulkheads in the upper 'tween decks to minimise the risk of fire spreading from one end of the ship to the other. The captain, officers and engineers are berthed in large houses on the shelter deck amidships, and the sailors and firemen under the fore part of the shelter deck. Triple-expansion engines will be supplied and fitted by Messrs. Richardsons, Westgarth & Co., Ltd., Hartlepool, having cylinders 26 in., 42 in. and 70 in. by 48 in., with three large single-ended boilers, 180 lbs. pressure, including Contraflo main condenser, Contraflo surface feed-heater and cascade filter, bronze working propeller, spare tail shaft, and a very complete outfit.

Athamas.—On June 19th, Messrs. Wm. Doxford & Sons, Ltd., launched from their yard at Pallion, Sunderland, the s.s. *Athamas*, built to the order of Messrs. A. A. Embiricos and Company, London. The dimensions of the vessel are:—Length, 382 ft.; breadth, 51 ft.; moulded depth, 25¾ ft.; deadweight capacity, 7,000 tons. During construction the vessel has been superintended by Mr. A. Kairis. Messrs. Doxford are supplying the engines and boilers. The classification is with British Corporation.

Eddystone.—On June 25th, Messrs. Richardson, Duck and Co., Ltd., launched from their yard a steel screw steamer of the following dimensions:—Length overall, 394 ft.; breadth, 51 ft.; depth moulded, 27 ft. 3 in.; gross tonnage about 4,220 tons. Deadweight about 7,400 tons on a moderate draught. This vessel has been built to the order of the Fargrove Steam Navigation Co., Ltd., of London (Messrs. Farrar, Groves & Co., managers), will class 100 A1 in Lloyd's Register, and has been built under special survey. She is a single-deck steamer with cargo poop, long bridge from before foremast to abaft mainmast, and topgallant forecastle. The engines by Messrs. Blair & Co., Ltd., have cylinders 26 in., 42 in., 70 in. by 48 in. stroke, steam being supplied by three single-ended boilers, having a working pressure of 180 lbs., and a large marine-type donkey boiler. The hull and machinery have been constructed under the supervision of Mr. F. W. Bardens, superintendent engineer to the Fargrove Line. Messrs. Wailes, Dove & Co.'s "Bitumastic" enamel has been applied to the engine and boiler-room tanks, and throughout the bunkers, and their patent "Bitumastic" covering to the tank tops.

Warley Pickering.—On June 29th, Messrs. Sir Raylton Dixon & Co., Ltd., launched from their Cleveland Dockyard, Middlesbrough, a fine steel screw steamer which they are constructing to the order of Messrs. Constantine & Pickering Steamship Co., of Middlesbrough. The vessel is being built to class 100 A1 at Lloyd's, and is of the single-deck type, with short poop, bridge and forecastle. Her principal dimensions are 377 ft. 6 in. by 51 ft. 2 in. by 28 ft. 4½ in. moulded, and she will have a deadweight carrying capacity of about 7,250 tons on a light draught of water. Saloon and accommodation for captain, officers, etc., will be provided in a large steel house at fore end of bridge deck with chart and wheel house above, on the top of which will be the flying bridge. The engineers, etc., will be berthed in side houses at aft end of bridge deck, while the sailors and firemen's quarters will be in forecastle. The vessel will have four holds, five hatches, two masts and three derrick posts, with eleven derricks, large donkey boiler, eight steam winches, steam windlass, hand and steam-steering gear, etc., and all the latest and most modern appliances for the rapid handling of cargo. Triple expansion engines, having cylinders 26 in., 42½ in. and 69½ in. by 45 in. stroke, supplied with steam by two large single-ended boilers working at 180 lbs. pressure, will be fitted by Messrs. Blair & Co., Ltd., Stockton-on-Tees. The hull and engines are being constructed under the superintendence of Mr. William Constantine.

Uskmoor.—On June 29th, there was launched from the shipbuilding yard of Messrs. John Blumer & Co., North Dock, Sunderland, the screw steamer *Uskmoor*, for Messrs. Walter Runciman & Co., of Newcastle and London. She is of the single deck type, with poop, bridge and forecastle, and perfectly clear holds, and is specially adapted to carry a large deadweight on a light draught. Water ballast is provided in double bottom and also in after-peak tank. Very spacious accommodation for captain, officers and engineers is arranged in large deckhouse on the bridge, and for the crew in the forecastle. The discharging gear is thoroughly up-to-date in every respect, and is specially arranged for dealing with heavy cargoes. Engines will be fitted by The North-Eastern Marine Engineering Co., Ltd., at their Sunderland works, and the winches and steering gear are by Messrs. John Wigham & Son, of Hylton.

Boscastle. On July 1st, Messrs. William Gray & Co., Ltd., launched the handsome steel screw steamer *Boscastle*, which they have built for Messrs. E. Jenkins & Co., Cardiff. She will take the highest class in Lloyd's Register, and is of the following dimensions, *viz.*:—Length overall, 309 ft.; breadth, 44 ft. 9 in.; and depth, 22 ft. 1 in., with long bridge, poop and topgallant forecastle. The saloon, state-rooms, captain's, officers' and engineers' rooms, etc., will be fitted up in houses on the bridge deck, and the crew's berths in the forecastle. The hull is built with deep frames, cellular double bottom and large aft peak ballast tank, five steam winches, steam-steering gear amidships, hand-screw gear aft, patent direct steam windlass, large patent vertical donkey boiler, stockless anchors, telescopic masts with fore and aft rig, and all requirements for a first-class cargo steamer. Triple-expansion engines are being supplied by the Central Marine Engine Works of the builders, having cylinders 22 in., 36 in. and 60 in. diameter with a piston stroke of 39 in., and two large steel boilers for a working pressure of 180 lbs. per square inch. The ship and machinery have been built under the superintendence of Messrs. N. T. and F. G. Daniels, on behalf of the owners.

LAUNCHES—Scotch.

Adriatco.—On June 18th, there was launched at Govan the twin-screw steamer *Adriatco*, which has been built for Italian owners. The *Adriatco* has been constructed under special survey to the British Corporation's highest class and to that of the Registro Nazionale Italiano. Superior accommodation is provided for about 200 first, second and third-class passengers. The vessel is 236 ft. long. The propelling machinery consists of two sets of triple-expansion engines, supplied with steam by two single-ended boilers.

Soure.—On June 28th, there was launched from the yard of Messrs. Murdoch & Murray, Ltd., Port Glasgow, a steel twin-screw steamer for passenger and cargo service on the river Amazon. The dimensions of the vessel are 180 ft. by 31 ft. by 19 ft. 6 in. to promenade deck. Accommodation is provided for a large number of passengers and all the most modern conveniences are embodied in the vessel. Powerful twin-screw triple-expansion engines with two boilers will be fitted on board by Messrs. Aitchison, Blair Ltd., Clydebank. During construction the hull and machinery have been built under the superintendence of Mr. James J. Peck, Glasgow.

Tregarth.—On June 28th, there was launched at Port Glasgow a steel screw steamer, named *Tregarth*, for the Rea

Shipping Co., Liverpool. Her dimensions are :—Length, 276 ft. ; breadth, 40 ft. 3 in. ; depth, 20 ft. 6 in. She is of 3,050 tons deadweight carrying capacity.

Infanta Isabel.—On June 29th, there was launched at Port Glasgow a large twin-screw steamer to the order of Messrs. Pinillos, Izquierdo y Ca. of Cadiz, for special passenger and emigrant service from Spain. The vessel is of the following dimensions :—Length, 460 ft. ; breadth, 58 ft. 3 in. ; depth moulded, 39 ft. 6 in., and of about 9,000 tons gross. She has been built to the highest class at Lloyd's and also to the requirements of the Spanish authorities for emigrant service. Suites of cabins de luxe for eight passengers are provided on the promenade deck. There are also preferred state-rooms for sixteen passengers, first-class state-rooms for about 120, second-class state-rooms for about 150 passengers, and accommodation for about 1,750 emigrants. The machinery consists of quadruple twin-screw engines with cylinders 24½ in., 35 in., 50 in. and 72 in. by 51 in. stroke. Steam will be supplied by three double-ended boilers and two single-ended boilers, all natural draught, at 215 lbs. working pressure. During construction the vessel has been superintended by Señor Ramon Garay, the Company's superintendent engineer, assisted by Captain Benitez.

Fordonian.—On July 2nd, there was launched from the yard of the Clyde Shipbuilding and Engineering Co., Ltd. Port Glasgow, an oil-motor driven package freight steamer, 250 ft. by 42 ft. 8 in. depth moulded, 16 ft. 10 in. to main deck, 26 ft. 6 in. to awning deck, for service on the Great Lakes Canadian trade. The vessel was named *Fordonian*, and immediately after the launch was placed in the Company's dock to receive her machinery. She is to be fitted with Diesel oil engines manufactured by the builders. The vessel has been built under Lloyd's survey.

Lees.—On July 2nd, Messrs. Wm. Simons & Co., Ltd., Renfrew, launched from their yard the dredger *Lees*, built to the order of the Indian Government for the improvement of the waterways in Burma. This dredger, which is of the "Simons" suction reclamation type, has been specially designed and constructed under the direction of Professor J. H. Biles, naval architect and consulting engineer to the India Office. The *Lees* is a twin-screw light draught cutter dredger and will work in conjunction with a floating pipe line and terminal pontoon, arranged for delivering dredged material over river or canal banks for land reclamation. The dredging pump is driven by an independent set of triple-expansion engines and the suction pipe is carried on a frame fitted in well at forward part of vessel. The lower end of suction frame is fitted with a steel spiral rotary cutter, driven by cast-steel machine-cut gearing from a set of horizontal compound engines placed on deck. The gearing and cutter are of ample strength to stall the engines when working at full power. Independent steam hoist gear is provided for controlling the suction frame, and very powerful manœuvring winches are placed at each end of vessel. An operating house is provided on upper deck containing all necessary levers and telegraphs to enable one man to have complete control of the dredging operations. The dredger is propelled by twin screws, each driven by a set of triple-expansion engines. Steam is supplied by two cylindrical multitubular boilers, constructed to Lloyd's requirements for a working pressure of 160 lbs. The boilers are fitted with Howden's forced draught for burning Indian fuel. A complete installation of condensing plant capable of dealing with exhaust steam from all the engines in the vessel at one time, independent automatic feed pumps, bilge pumps, service pumps, pressure pumps, filters and all other usual auxiliaries for a vessel of this type, are provided in engine room. A repair shop with electrically-driven machine tools capable of overtaking minor repairs is fitted on board. Electric light installation is provided both above and below deck. The vessel is provided with every accommodation necessary for a crew working in a hot climate.

Y Ddraig Goch.—On July 2nd, there was launched from the yard of Messrs. Napier & Miller, Ltd., Old Kilpatrick, the auxiliary surveying vessel *Y Ddraig Goch*, built for Mr. Godfrey H. Williams, of Aberpergwm, to the specification of Mr. William Gray, London. The vessel is 200 ft. on water line, 38 ft. breadth, 21 ft. 6 in. depth, with high 'tween decks for accommodation, four masts with large spread of sail, and classed 100 A1 at Lloyd's. Propelling machinery consists of single-screw gas engine with six cylinders about 225 horse-power. There is a suction gas producer with washer complete on board, anthracite coal being used. The vessel has gun-metal Bevis reversing propeller, an auxiliary gas motor drives a dynamo supplying the current throughout the ship for working the various pumps, windlass and capstan. There is large bunker capacity which would enable the vessel practically to make a cruise round the world without refilling her bunkers.

Indarra.—Messrs. Wm. Denny & Bros. recently launched at Dumbarton a twin-screw steamer named *Indarra*, which has been constructed for the Australasian United Steam Navigation Co. The vessel, which is built of mild steel to Lloyd's 100 A1 class, is 450 ft. long. She will have accommodation for 230 first, 140 second and 120 third-class passengers. The propelling machinery consists of two sets of quadruple-expansion engines supplied by Messrs. Denny and Bros. For handling the boats a powerful electrically-driven winch is fitted.

Evangeline.—On July 4th, the London and Glasgow Shipbuilding Co. launched at Govan the steel twin-screw passenger steamer *Evangeline*, which has been built for the Canada Atlantic and Plant Steamship Co., of Halifax (N.S.), for the trade between Boston and the Canadian maritime provinces. The new vessel is being constructed to Lloyd's highest class. She is 365 ft. long, and has a gross tonnage of 4,600 tons. The *Evangeline* will have two sets of four-cylinder triple-expansion balanced engines, each set having cylinders 24 in., 38½ in. and two of 44 in. in diameter, with a stroke of 33 in. The machinery is capable of developing 5,500 i.h.p. when running at 146 revolutions per minute. The circulating engines are independent. Accommodation for 580 passengers is provided. There are also eighteen cabins de luxe, specially designed and elegantly furnished. This is the first vessel launched since the yard has been acquired by Messrs. Harland and Wolff, Ltd.

Screw Steamer.—Messrs. Hall, Russell & Co., Aberdeen, launched on July 11th a screw steamer, built to the order of London owners. The vessel will take the highest class in Lloyd's Register, and is of the following dimensions :—Length between perpendiculars, 155 ft. ; breadth, 26 ft. ; and depth, 13 ft.

Mungo.—Messrs. John Fullerton & Co., Paisley, recently launched a screw steamer of 430 tons deadweight carrying capacity which they have built to the order of Messrs. Joseph Fisher & Sons, Newry. Compound engines of 400 i.h.p. will be supplied by Messrs. Fishers, Ltd., Paisley. The steamer, which has been built under the superintendence of Mr. W. Hardy, Newry, was named *Mungo*.

LAUNCH—Irish.

Drina.—On June 29th, the fifth of the new large twin-screw steamers, the *Drina*, intended for the intermediate passenger service of the Royal Mail Steam Packet Co. to Brazil, Uruguay and Argentina, was launched by Messrs. Harland & Wolff, Ltd., Belfast. Her dimensions are as follows :—Length, 517 ft. 3 in. ; breadth, 62 ft. 3 in. ; gross tonnage about 11,500 tons. The *Drina* is being constructed for Messrs. Elder Dempster & Co., Ltd., but will be chartered by the Royal Mail Steam Packet Co. She is an exact facsimile of the Royal Mail Steam Packet Co.'s new steamers *Deseado*, *Demerara*, *Desna* and *Darro*. The first-class dining saloon and smoking-room are situated on the awning and bridge decks respectively. The dining saloon will seat 120 persons at small rectangular tables. The first-class state-rooms on the bridge deck are arranged in single and two-berth rooms, all with cot bedsteads (no upper berths). Communicating doors are fitted between each alternate pair of state-rooms. There are also state-rooms on the awning deck arranged in two and three-berth rooms on the tandem principle, thus giving daylight and natural ventilation to each room. Every first-class cabin has an electric fan—a provision which will be very popular with the passengers. The first-class stairways and entrances are forward and aft of the state-rooms on the bridge deck. The whole of the accommodation is decorated in an excellent manner. The intermediate dining saloon is on the awning deck aft, and the smoking-room on the poop deck. The state-rooms for the intermediate

class passengers are arranged in the poop and are comfortably fitted; each cabin is provided with an electric fan. The third class general room and the smoke room are in the steel house on awning deck aft, have wood panelling and framing finished white and sparred seats of oak and teak. The third class saloon is situated on the main deck amidships, and will seat a large number of passengers. The third class shelter is under the forecastle, and is fitted with wood-spatted seats. There are barber's shop, purser and doctor's rooms and surgery in convenient situations. The *Burma* will carry a large quantity of cargo, having holds insulated for the conveyance of chilled or frozen meat. There are also compartments insulated for dairy produce and fruit. The appliances for working ship and cargo are of the most modern type. The vessel will have a complete installation of electric light and submarine signalling apparatus. The engines are arranged on the "balanced" principle which has been so successful in eliminating vibration; and with the large airy cabins, electric fans and good promenades, these vessels will be exceedingly comfortable for passengers.

TRIAL TRIPS.

Holmwood.—On June 17th, the steel screw steamer *Holmwood*, built by Messrs. the Northumberland Shipbuilding Co., Ltd., Howdon-on-Tyne, to the order of Francis Stanley Holland, Esq., London, left the Tyne for her official trial trip. The vessel is 300 ft. long by 40 ft. beam by 29 ft. deep, and has been built under special survey to the highest class at Lloyd's. She is fitted with long bridge, long poop, top-gallant forecastle, the accommodation, which is very ample, being placed in steel houses on the bridge deck. The 'tween decks are lofty and so arranged that cattle, troops or emigrants may be carried if necessary. Special attention has been given to the loading and discharging gear, and a complete outfit for the rapid handling of cargoes arranged for, consisting of ten steam winches by Messrs. Clarke, Chapman & Co., Ltd., Gateshead-on-Tyne, a large number of cargo derricks, and steam windlass by Messrs. Clarke, Chapman & Co. She is fitted with the usual water ballast arrangements for light passages. The machinery has been supplied by Messrs. Richardsons, Westgarth & Co., Ltd., of Sunderland, consisting of engines with cylinders 25 in., 41 in., 69 in. by 48 in. stroke, and three large steel boilers with 180 lbs. pressure. This vessel carries 7,500 tons on a light draught and steams about 10 knots loaded at sea. The trial trip proved in every way satisfactory, and a speed of 11½ knots was obtained. After the trial trip the vessel proceeded to Commissioners' Staiths to load for River Plate under the command of Captain A. A. de Rouffignac.

Comanchee.—Recently the steel screw petroleum steamer *Comanchee*, built on the Tyne to the order of Messrs. H. E. Moss & Co., of Liverpool, London and Newcastle, and transferred by them to the Anglo-American Oil Company, Ltd., of London, has been to sea for her trial trip. After adjusting the compasses, a satisfactory endurance trial of six hours was carried out, when a mean speed of 11½ knots was obtained. After bunkering on the Tyne, she proceeded to New York under the command of Captain Read. Messrs. Wailes, Dove & Co.'s "Bitumastic" enamel has been applied to the upper and lower 'tween-deck bunker, reserve bunkers, engine and boiler-room tanks and boiler spaces, etc. For Launch, see July issue.

Haworth.—On June 20th, the new Wear-built steamer *Haworth* was taken to sea for her trial trip. She has been built to the order of the Dalgliesh Steam Shipping Company, Newcastle-on-Tyne. The leading particulars are as follows:—Length, 363 ft.; breadth, 50 ft. 10 in.; depth moulded to bridge deck, 33 ft. The propelling machinery has been supplied by the North-Eastern Marine Engineering Co., Ltd., Sunderland, and consists of a set of triple-expansion engines, with cylinders 25 in., 41 in. and 67 in. by 45 in. stroke, steam being supplied from three large boilers. The trial trip was under fully-loaded conditions, and passed off successfully, the machinery working well. A speed of 10¾ knots was easily attained.

El Paraguayo.—On June 20th, the twin-screw insulated steamer *El Paraguayo* proceeded on her official trial trip. The *El Paraguayo* is the first of two duplicate vessels built by Messrs. Irvine's Shipbuilding & Dry Docks Co., Ltd., West Hartlepool, for The Houlder Line, Ltd., and she will take her place in the new fortnightly express service of steamers between the River Plate and Liverpool. A lengthy description of the vessel was given in our December, 1911, issue. Externally, the vessel presents a magnificent picture, the lines of the hull and imposing deck erections of the passenger accommodation, the massive funnel and tapering masts, giving her a most striking appearance. Throughout the trial the engines and all auxiliaries worked splendidly, the owner's representatives expressing entire satisfaction, and on six runs north and south on the Whitley Bay measured mile a speed of 15·45 knots was obtained. The owners were represented on board by Mr. Frank Houlder and Mr. Maurice Houlder, Mr. A. S. Pardon represented the builders, and amongst a very large company present were Mr. John Esplen, of Messrs. Wm. Esplen & Sons, Liverpool, Major Peters, Mr. Urwin, of the Sansenina Co., Mr. McAuslan, of Lloyd's, Mr. Marshall, of the Board of Trade, etc., etc.

Penolver.—On June 22nd, the handsome steel screw steamer *Penolver*, built by Messrs. Wm. Gray & Co., Ltd., West Hartlepool, for Mr. Richard B. Chellew, of Truro, had her trial trip. The owner was represented by Mr. John Chellew, under whose superintendence the ship and her machinery have been built. Mr. James Innes and Mr. W. M. Ward, surveyors to Lloyd's Registry, were also on board. The performance of both ship and machinery gave entire satisfaction, the speed obtained being 12 knots. The vessel afterwards proceeded on her voyage to Cardiff to load. For Launch, see July issue.

Deseado.—On June 27th, the fine twin-screw passenger steamer *Deseado*, constructed for The Royal Mail Steam Packet Company by Messrs. Harland & Wolff, Ltd., left Belfast for Liverpool to inaugurate the R.M.S.P. South American Passenger Service from Liverpool. Her dimensions are as follows:—Length, 517 ft. 3 in.; breadth, 62 ft. 3 in.; gross tonnage about 11,500 tons. For Launch, see December, 1911, issue.

New Londoner.—On June 29th, the steel screw passenger and cargo steamer *New Londoner* proceeded on her official trial trip. The vessel carried out progressive trials over the Whitley Bay measured nautical mile, and ran from 9 knots up to 14½, which is her maximum speed when fully loaded. This was considered highly satisfactory, as the guaranteed speed was only 13 knots. For Launch, see July issue.

Burma.—On June 29th, the handsome steel screw steamer *Burma*, built by Messrs. Wm. Gray & Co., Ltd., West Hartlepool, for the Societa Anonima Ungherese d'Armamento Marittimo, of Fiume, was taken for her trial trip. The owners were represented by Mr. Nicolich, of Fiume, Mr. E. Glover, of London, and Mr. J. S. Bonnyman, of Cardiff, the latter gentleman having superintended the construction of the vessel and machinery. Mr. James Innes represented Lloyd's Registry, and the vessel was in command of Captain Thian. After adjustment of compasses, a run along the coast to Sunderland and back was made, the average speed being 12¾ knots, and the performance of vessel and machinery entirely satisfactory. The *Burma* afterwards proceeded on her voyage to Burntisland to load. For Launch, see June issue.

Easton.—The new Wear-built steamer Easton has just been to sea on her official trial. She has been specially built for the Canadian Lake Service, and takes the highest class at British Corporation. Her principal dimensions are:—Length, 250 ft.; breadth, 42 ft. 6 in.; depth, 18 ft. 6 in. The main engines are by the North-Eastern Marine Engineering Co., Ltd., Sunderland, and have cylinders 17 in., 28 in. and 46 in. by 33 in. stroke, steam being supplied by two large boilers working at a pressure of 185 lbs. per square inch. The vessel has been constructed to the order of the Mathews Steamship Co., Ltd., of Toronto. The trial was in every way satisfactory, a mean speed of 10½ knots being easily maintained. The steamer proceeded direct to Middlesbrough to load a cargo for Canada.

Warilda.—The new steamer *Warilda*, built by Messrs. William Beardmore & Co., Dalmuir, for the Adelaide Steamship Company of South Australia, recently completed her official trials on the Firth of Clyde. Although the weather was not favourable for the best results, the trials were carried out with marked success. The *Warilda* is the first of three twin-screw steamers which Messrs. Beardmore have on hand for the same owners. The vessels have been specially designed for a fast passenger service round the coast of

Australia. The propelling machinery consists of two sets of quadruple-expansion engines, designed to give a speed of 15 knots. The *Warilda* has returned to Dalmuir, where her machinery will be examined and the steamer prepared for her voyage to Australia. For Launch, see January issue.

Clan Macewen.—The steamer *Clan Macewen*, built at the Hebburn works of Messrs. Palmers' Shipbuilding and Iron Company, Ltd., to the order of Messrs. Cayzer, Irvine & Co., Ltd., Glasgow, for their Australian trade, recently completed her steam trials. On the trial the results were highly satisfactory, all the contract conditions being fully met. There were present at the trial Mr. A. B. Cayzer and Mr. John Lyall, representing the owners; Mr. J. W. Reed and Mr. J. M. McFarlane were present on behalf of the builders. For Launch, see May issue.

Sir Richard Awdry.—On July 2nd, the s.s. *Sir Richard Awdry*, built by the Clyde Shipbuilding and Engineering Co., Ltd., Port Glasgow, to the order of the Pekin Syndicate Limited, was taken for a trial run on the Clyde. The vessel attained a speed of 11½ knots on trial. Mr. Wm. Jas. Douglas, M.I.N.A., of London and Marseilles, the Company's consulting naval architect, who, assisted by Mr. T. Weir, superintended the design and construction of the vessel, expressed himself, on the owners' behalf, as well satisfied with the result. For Launch, see June issue.

La Rosarina.—On July 4th, the large twin-screw steamer *La Rosarina*, built by Messrs. Palmers' Shipbuilding and Iron Co., Ltd., at their Hebburn Yard, was taken to sea to undergo her steam trials. She is one of several insulated steamers built or building to the order of Messrs. Furness, Withy & Co., Ltd., for the new fortnightly express service between the River Plate and Liverpool, such service alternating with the service inaugurated by the Royal Mail Steam Packet Company, making a fast weekly service to this country. These vessels are the largest meat carriers yet constructed, having an insulated capacity of about 420,000 cubic feet; the whole of this space is fitted either for the carriage of chilled or frozen meat. *La Rosarina* has been designed in excess of the rules and regulations governing the highest class in Lloyd's Registry. She has the Board of Trade certificates for the carriage of passengers and emigrants, and complies with the requirements of the Spanish laws in relation to the carriage of emigrants. The vessel, which is 460 feet long, is fitted with four complete decks all fore and aft, with a bridge over the shelter deck 140 ft. long, and a boat deck above this. The vessel has nine steel watertight transverse bulkheads extending to the shelter deck, which, with the various decks, divide the vessel into twenty-six compartments, twenty of which are insulated throughout. Accommodation for a limited number of first-class passengers is provided. About 400 emigrants can be carried under the bridge deck and under the poop deck. The refrigerating machinery consists of two horizontal combined surface-condensing duplex refrigerating machines of the most improved type, the machines being so arranged that each may be worked entirely independently of the other, all parts being interchangeable in the case of a breakdown. The machinery, which has been constructed by Messrs. Palmers' Company at their Jarrow works, consists of twin-screw triple-expansion engines, the cylinders being 25 in., 41½ in. and 70 in. by 48 in. stroke, with six large boilers working under forced draught at a pressure of 200 lb. per square inch. The engines are designed for a high rate of piston speed, and embody the latest improvements in marine engine practice. The propellers are of the built type with manganese bronze blades. The engines were run for several hours, the i.h.p. developed being over 6,000. A mean speed of 15 knots was attained. At the conclusion of the trial the vessel sailed on her voyage to Vigo under the command of Captain Evans.

Prince Edward.—On July 4th, the new steamer *Prince Edward*, built by Messrs. A. & J. Inglis, Pointhouse Shipyard, for service on Loch Lomond, ran trials on the loch. The vessel, which has been built to the order of the Dumbarton and Balloch Joint Line Committee, is larger than any of the other steamers on the service, and is the largest vessel which can at present be taken to the loch by way of the Leven. Her dimensions are:—Length, 175 ft.; breadth, 22 ft.; and depth, 6 ft. The machinery consists of a set of compound engines capable of developing 1,000 horse-power. The *Prince Edward* is the only vessel on the service fitted with engines of the compound type, and it is anticipated that a saving will be effected in the consumption of fuel to the extent of 33 per cent. The *Prince Edward* is designed for a speed of 15 knots. Large and sumptuously furnished saloons are fitted in the vessel both forward and aft, and excellent accommodation is provided for a large number of passengers.

Dimboola.—On July 4th, the *Dimboola*, the latest addition to the fleet of the Melbourne Steamship Co., Ltd., went for a successful trial trip off the Tyne. On the trial trip everything worked perfectly satisfactorily, and a speed of over 13½ knots per hour was attained. This is well in excess of the contract requirements. The owners were represented on the trial trip by Mr. Thompson, of the firm of Messrs. Thompson, Evres & Bryers, Sunderland, consulting engineers to the Melbourne Steamship Co., Ltd., under whose superintendence the vessel has been built, and by Captain Roy. The builders were represented by their director, Mr. G. F. Tweedy. For Launch, see July issue.

Glen Avon.—On July 8th, the new paddle steamer *Glen Avon*, built by the Ailsa Shipbuilding Company, Troon, to the order of Messrs. P. & A. Campbell, Bristol, for their passenger service between Bristol, Newport and Ilfracombe, ran her trials on the Firth of Clyde. The trials were satisfactory in every respect.

Barjona.—On July 8th, the new British-India steamer *Barjona*, of 3,400 tons, built and engined by Messrs. Barclay, Curle & Co., Whiteinch, carried out trials over the measured mile at Skelmorlie. It was arranged that at the conclusion of these the vessel should go on a steaming test of 48 hours' duration. Messrs. Wailes, Dove & Co.'s "Bitumastic" enamel has been applied throughout the bunkers, boiler-room tank, and their patent "Bitumastic" covering to the tank tops.

Saint Hugo.—On July 10th, the new steamer *Saint Hugo*, built by Messrs. Archd. McMillan & Son, Ltd., Dumbarton, for Messrs. Rankin, Gilmour & Co., Liverpool, ran trials on the Firth of Clyde. The machinery was supplied by Messrs. David Rowan & Co., Glasgow. On completion of the trials, which were in every way satisfactory, the steamer left for Cardiff to load.

Steinstad.—On July 10th, the first-class cargo steamer *Steinstad*, built by Messrs. Robert Thompson & Sons, Ltd., at their Southwick Yard, to the order of Messrs. A. F. Klaveness & Co., of Lysaker, Norway, being the fifth vessel built by them for this Company, was taken out to sea for her official trial. The trial trip was very successful, the engines running with perfect smoothness, and a mean speed of about 11 knots was easily attained. Captain Raastad, on behalf of the owners, expressed entire satisfaction with both the vessel and machinery. After the trial the vessel proceeded to Blyth to load. For Launch, see July issue.

Tury Assu.—On July 11th, this vessel, which has been designed and constructed by Messrs. James Pollock, Sons and Co., Ltd., of 3, Lloyd's Avenue, London, for Brazilian clients, ran her trial on the Firth of Clyde with most satisfactory results, the speed obtained being half a knot in excess of that specified. The dimensions of the vessel are:—Length, 200 ft. by 32 ft. depth, carrying 500 tons on 9 ft. 6 in. draught. The steamer, which is built to Lloyd's Rules, is of the flush-deck type of cargo and passenger steamer, with main, promenade and bridge decks. The *Tury Assu* makes Pollock's record for the Amazon over 150 vessels, including twenty-eight twin-screw craft. For Launch, see July issue. Messrs. Matthew Keenan & Co., Ltd., have completed the covering of the boilers and steam pipes on board.

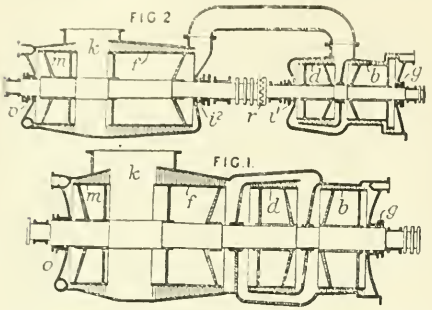
Crios.—On July 12th, the s.s. *Crios*, built and engined by Messrs. Wm. Doxford & Sons, Ltd., Pallion, Sunderland, to the order of Messrs. A. A. Embiricos & Co., London, ran a successful fully-loaded trial, when a mean speed of 10¾ knots was obtained. The vessel is 396 ft. long, 52 ft. broad, 25 ft. moulded depth. Deadweight, 7,400 tons. During construction the vessel has been superintended by Mr. A. Kairis. Classification is with the British Corporation.

Lynton Grange.—On July 12th, the steel screw steamer *Lynton Grange*, built by The Northumberland Shipbuilding Co., Ltd., Howdon-on-Tyne, to the order of Messrs. Furness, Withy & Co., Ltd., West Hartlepool, for the Houlder Line, Ltd., London, of which Messrs. Houlder Bros. & Co., Ltd., are the managers, left the Tyne for her official trial trip. The trial trip proved in every way satisfactory, and a speed of 12¾ knots was obtained. For Launch, see July issue.

The Marine Engineer and Naval Architect Patent Record.

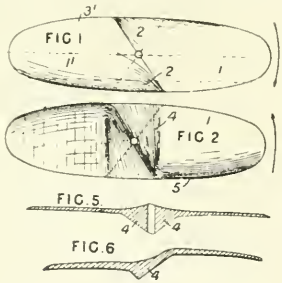
Compiled by Messrs E. P. Alexander & Son, Chartered Patent Agents, 306, High Holborn, London, W.C.

6653. Turbines. In a marine turbine installation comprising an ahead turbine *b*, *f*, *f*, and an astern turbine *m* with a common exhaust *k*, the excess of the axial thrust due to the working fluid over the propeller thrust is balanced by reversing the direction of flow in an intermediate stage *d*, the high pressure stages of the ahead and astern turbines being arranged adjacent to the ends of the casing or casings,



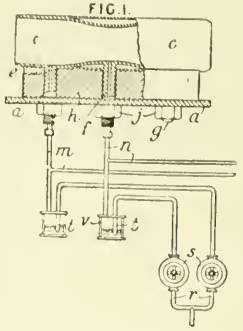
so that their stuffing-boxes *g*, *o* are easily accessible from the outside. In Fig. 2, the axial thrusts on the drums *b*, *d* of the ahead turbine due to the working fluid balance one another; and the thrust on the third drum *f*, which is arranged in a separate casing with the astern turbine *m*, is adapted to balance the propeller thrust. The stuffing-boxes *g*, i^1, i^2, *o* are easily accessible. The shafts are connected by an axially-movable clutch *r*.

7536. Screw Propellers. Screw-propeller blades in which the pitch increases from the boss to the tip and from the leading edge to the trailing edge are formed at the boss with planes which act as diverting and retaining surfaces. Each



blade 1 has on its front face near the trailing edge a plane 2 which directs the water under the leading edge 3^1 of the next blade 1^1. On the back face, a surface 4 acts as a retaining surface and diminishes the velocity of the fluid past the edge 5.

7598. Nautical Instruments. The speed of a ship is obtained by measuring the difference between the pressures at the widest and narrowest parts of a tube *c*, which is of the kind used in a "Venturi" meter and is attached to the ship below the surface of the water. In Fig. 1, *a* represents one of the bottom or side plates of the ship between which and the tube *c* is a distance-piece *h*. The tube *c* is provided with tubular projections *e*, *f*, *g*, which pass through the skin of the ship and are secured by nuts *j*, the tubes *e*, *f* being connected by means of tubes *m*, *n* to one or more pressure



gauges. An air pump or the like is employed to force air through the tube *r* and through cocks *s* into tubes *t*, the lower ends of which dip into oil or other liquid contained in chambers *v*, the upper ends of these chambers being in connection with the tubes *m*, *n*. The rate at which air bubbles through the vessels *v* can be observed. In a modification, the tube *c* is towed instead of being fixed to the ship.

LAUNCHES—English—continued.

Diesel-engined Vessel.—On July 1st, Messrs. W. Harkess and Son, Ltd., launched from their shipbuilding yard at Middlesbrough a twin-screw Diesel oil-engined vessel, built to the order of Messrs. Swan, Hunter & Wigham Richardson, Ltd., Wallsend, for the Canadian Lake Service, dimensions 248 ft. by 42 ft. 6 in. by 19 ft. depth moulded, to carry about 2,700 tons. Oil is carried in two large tanks built into the decks; after-peak is also fitted as oil reserve tank. The crew is provided with rooms in large topgallant forecastle, and officers in poop. After the launch the vessel proceeded to the Neptune Engine Works, Walker, for her machinery. The vessel has been built to special British Corporation class.

Russian Prince.—On July 2nd, there was launched from the yard of the Tyne Iron Shipbuilding Co., Ltd., of Willington Quay-on-Tyne, a steel screw steamer of the following dimensions, *viz.*:—Length, 370 ft.; breadth, 48 ft. 2 in.; depth moulded, 28 ft. 3 in. The vessel, which has been built to the order of The Prince Line, Ltd., Newcastle-on-Tyne, is designed for the purpose of carrying petroleum and other oils in bulk, and is built on the Isherwood patent system of longitudinal framing, and to the highest classification at Lloyd's. The vessel is fitted with a very complete oil-pumping installation, including oil pumps of large size for working against a heavy back pressure, and is also fitted with a complete system of steam heating coils in each oil tank. The accommodation, which is much superior to the ordinary class of vessel, has been carried out to the special requirements of the owners, and includes steam heating and electric light throughout. The machinery, which has been constructed by The Wallsend Slipway and Engineering Co., Ltd., consists of engines having cylinders 25 in., 42 in. and 68 in. by 48 in. stroke, with two boilers working at a pressure of 180 lbs. During construction, the vessel and machinery have been under the inspection of Mr. J. Traill and Mr. J. Pringle, of the Prince Line, Ltd., Newcastle-on-Tyne, and of Mr. J. D. Crohan, of Messrs. Flannery, Baggallay and Johnson, of London.

The Marine Engineer

And Naval Architect.

LONDON, SEPTEMBER, 1912.

THE "TITANIC" JUDGMENT AND THE ADVISORY COMMITTEE'S REPORT.

THE issue last month of the judgment of Lord Mersey on the *Titanic* enquiry, and of the report of the Merchant Shipping Advisory Committee, marks a stage in the history of the mercantile marine, and in the future construction, equipment and navigation of passenger steamers of a most important character. Some of the recommendations made are of a most far-reaching character, and until sufficient time has been given to work them out in practical detail, it is almost impossible to define the real effect of them on the shipbuilder, the shipowner, the ship itself and the public as passengers. It will be recognised by all level-headed people that Lord Mersey's judgment is a most impartial and able one, and those who followed the enquiry closely must appreciate how much the efficiency of the conduct of the tribunal, and the value of the result obtained, was due to the intimate knowledge of maritime matters possessed by Lord Mersey himself, and, assisted as he was by five most able assessors, the recommendations of his report will command the respect and consideration due to them. The general effect of the report will be to steady public opinion and bring back the proper sense of proportion which has been lost, as it usually is, in matters of unusual occurrence, particularly in cases of accident. The impulse stimulated by the report is in the direction of providing against such calamities in the future, rather than brooding over those of the past.

The loss of the ship, according to the judgment, was due to collision with an iceberg, brought about by the excessive speed, and the Court accepted the evidence as to the conditions applying to navigation that had obtained in the past. The practice, in the past, of maintaining the speed when in the vicinity of ice and trusting to a sharp look-out to avoid danger, appeared to be justified by past experience, but the recent disaster has now shown the practice to be bad, and Lord Mersey, in stating that Captain Smith had made a grievous mistake, did not blame him for it, as he had not the experience which his own misfortune has afforded to those whom he has left behind, and intimated that what was a mistake in the case of the *Titanic* would, without doubt, be negligence in any similar case in the future. In dealing with the sinking of the ship, the report states that if the four forward compartments only had been flooded the ship would have remained afloat, but with the No. 6 boiler-room flooded also the ship would sink sufficiently deeply to cause the water to flow over the bulkhead in No. 5 boiler-room, and so on in succession to the other boiler-rooms, until the ship was overwhelmed. As to the sub-division of ships generally, the report recommends that certain suggestions be referred to the newly-appointed Bulkhead Commission for enquiry and report as to the desirability and practicability of providing ships with either a double skin carried up above the water-line, or, as an alternative, with a longitudinal vertical watertight bulkhead on each side of the ship, extending as far forward and aft as possible, or with a combination of the two systems. These suggested provisions are to be in addition to water-tight transverse bulkheads. A further recommendation to the Commission is the question of fitting a deck or decks at a convenient distance or distances above the water-line which shall be water-tight throughout a part or the whole of the ship's length, and of means by which the necessary openings in such decks should be made water-tight, whether by doors, bunks or by other means. A number of other recommendations are made as to sub-division of the ship, lifeboats and rafts, manning the boats and boat drills. With reference to the suggestion as to the double skin for the hull, it is conceivable that such a provision would be effective where damage of small magnitude was suffered, but in the case of such damage as occurred to the *Titanic* it is open to very grave question as to whether the damage to the outer skin would not have extended to the inner skin, and neutralized the efficiency of the latter, and if such a course of construction be insisted on it is doubtful whether the increased cost of the structure is adequately met by a corresponding advantage as to safety. We are entirely in agreement with the view that the development of ship design should be in the direction of increasing the unsinkability of the ship rather than leaving the ship as it is, or only slightly modifying it and relying on boats, rafts and such appliances. The *Titanic* is a case in point—although there was only lifeboat accommodation for about half the number on board, the number of lives saved was less than two-thirds of that accommodation, so that had there been twice the number of boats it is open to question whether any much greater number would have been saved than were. In disasters of this kind time is an important factor, and if the boats had been available, and the people been ready to leave the ship, was there sufficient time for the boats to be out in the water and the people got into them before the ship sank? We believe that actual experience has shown that 1,000 to 1,100 per hour is the maximum obtained with troops on a troopship, where the discipline is the best; what would the number be on a passenger ship, where the discipline is practically *nil?* It may be said that this can be overcome by boat drills and so it may, but only to a certain small extent,

and their duty with the ready co-operation of the passengers, but the fact remains that even if the full complement of boats can be stowed on board in accessible positions they have got to be manned, to be put in the water with their living complement and got clear of the ship. In fine weather and in daylight this might be possible but what is the possibility of this in bad weather, on a dark night and with a mass of undisciplined people, some of whom at the last minute refuse to be separated from their friends or relatives? The problem is not an easy one and the more one thinks about it the more one feels that money spent in other directions than boats is likely to be more reliable and efficacious when the time of stress arises. However, we do not quarrel with the suggestion of boats for all, but only desire to emphasize the point that the protection to the passengers and crew afforded by such appliances very largely depends on the physical conditions that obtain at the time, as well as the mental conditions of the people concerned. Before leaving the report of the Commission we should like to express our satisfaction with the views expressed by Lord Mersey as to the conduct of Captain Smith, Mr. Bruce Ismay and the passengers, and we feel that those views will be shared by all those who take the trouble to analyse and carefully weigh the evidence. Turning now to the Blue Book containing the report of the Merchant Shipping Advisory Committee, in respect of the statutory regulations as to boats and life-saving appliances and other means of ensuring safety of life at sea, which was issued on Angust 15th, we find the following subjects have been dealt with by five sub-committees:—Type of spare lifeboats, wireless telegraphy, steamship routes, home trade passenger ships, and statistical information. In dealing with sea casualties since 1885, the Committee point out that since the introduction of the existing Life-Saving Regulations there has been a marked diminution in the loss of life at sea in spite of the large increase in the number of lives carried, but this is due mainly, if not entirely, to the prevention of casualties necessitating recourse to boats and other life-saving appliances and not from the succour afforded by such appliances after such disasters have taken place. With the exception of possibly one case there is no evidence of any life having been lost owing to lack of boat accommodation since the introduction of the existing regulations. With reference to the *Titanic* the proved impossibility of keeping her afloat after her collision has created a new situation in the opinion of the Committee, and it is important to bear in mind that the vessel belonged to a special and limited class and the circumstances of the loss of such a vessel have little, if any, relation to the equipment of the 6,540 cargo vessels engaged in the home and foreign trade, and have no relation to the equipment to be carried on the remaining 6,351 vessels, of which all but 195 are under 100 tons, of the British Mercantile Marine. The Committee state that the circumstances attendant on the loss of the *Titanic* have demonstrated the extraordinary difficulty, even in calm weather, of using to the full on a passenger vessel, carrying large numbers, the boat accommodation already provided, and they emphasize the view expressed by them in 1911 as to the necessity for taking all possible precautions to provide for the buoyancy of the vessel after the casualty and efficient means for communicating with the shore and other vessels. They consider that the boats to be carried under the davits should be as heretofore based on the gross tonnage, but that the additional boat and life-raft accommodation should be based on the total numbers on board and not on a percentage calculated on the tonnage scale, so that provision shall be made for every person carried. As to manning the boats and boat drill the Committee recommend that each passenger vessel trading outside the home trade limits should have at least three efficient boat hands, of which two shall be able seamen, for each boat carried and that training and organizing of the crew for boat drill is essential. With reference to binoculars it is considered inadvisable to provide them to the look-out man, as they restrict the field of vision and thus an object might be missed which would readily be picked out with the naked eye. As to the use of search lights the disadvantages attaching to their use greatly outweigh their advantages, and their adoption in the mercantile marine would be inadvisable. In the matter of the speed of steamships the Committee consider the present regulation will be sufficient if Article 16 is made to read: "Every vessel shall in a fog, mist, falling snow or heavy rain storms or at night in the known vicinity of ice, go at a moderate speed, having careful regard to the existing circumstances and conditions." It is the opinion of the Committee that on every passenger and emigrant ship means of access on to the bulkhead deck should be provided from each compartment below that deck. Every foreign going vessel, whether British or foreign, and having more than fifty persons on board, including passengers and crew, should have radio-telegraphic apparatus installed on board and such vessel should carry one qualified operator and one or more assistants so that a constant watch may be maintained. The steamship routes as at present settled are safe and prudent in all but abnormal ice seasons and any variation should be left to the steamship lines. The Committee finally recommend the securing as far as possible of international uniformity in any new regulations or requirements which may be imposed on the shipping community. These recommendations, if finally adopted, will throw a large increase of work on the Board of Trade and will necessitate no doubt a considerable augmentation of the staff to carry out the necessary supervision.

THE NATIONAL INSURANCE ACT.

THIS Act as applied to Seamen—under which term are included all hands and the cook—does not cover unemployment meantime, but an allowance of ten weeks is made each year, during which the payments are exempted. For the purposes of the Act, engineers, excluding the chief, come under the manual labour clause, so that, irrespective of the scale of pay exceeding £160 a year, all require to be insured; thus, 2nd engineers who pay income tax have to face the National Insurance Tax as well. There are several details not yet made clear in connection with the Act, and the bearing which the Workmen's Compensation Act has upon it in respect to accidents. Companies whose vessels are manned by natives of India and other countries, pay for the privilege of employing such, but the men themselves do not pay, nor do they reap any benefit, the payments made go towards the maintenance of the approved Seamen's Society and to form a fund for possible pensions or other benefits. The seaman—using the term in its widest sense—who completes a voyage from the United Kingdom and back makes his payments, and afterwards may have an engagement in foreign waters for one, two or more years; he is thus probably beyond the scope of the Act, but if he returns to Britain his former payments should be allowed to stand to his credit. A large proportion of seamen have ever been insured in a Society for death benefit to the family; such has proved a great boon and should be maintained. One great teaching should underlie the Act and ought to be inculcated, that is, the habit of thrift, a habit which is not so generally exercised as it ought to be, and we have no sympathy with those firms who, with the best intentions, have proposed to pay, besides their own share of the Insurance Tax, the share of their employees, as by so doing they defeat one of the essentially good points in the Act, if it were not spoiled by the wording and the method of payment. The act of payment and the responsibility should remain with the employee. There ought to be, and probably there will be as the funds accumulate, some benefit accruing to the healthy as well as to the sick, to the strong as to the weak. One might pay contributions for years and draw no benefit, while others might make a point of drawing as often as possible, as is the case in some societies. A great deal of the controversy and natural feeling against the Act itself would have been avoided had some of the objectionable features been left out and industrial responsibility with regard to thrift been clearly defined. The Shipping Federation still continue the benefit scheme which was inaugurated many years ago, so that for a small annual payment insurance was effected.

INSTITUTION OF MECHANICAL ENGINEERS. At the Belfast Meeting, Mr. W. Redfern Kelly, Engineer-in-Chief to the Belfast Harbour Commissioners, read a paper on the New Graving Dock, Belfast, and its mechanical plant and general appliances.

THE BRITISH ANTI-VIBRATION AND NOISE CO., LTD., of Glasgow have issued an interesting booklet on the subject of "The Isolation of Vibration and Noise." The company are specialists in the prevention of vibration and noise, and their devices are explained in the booklet

THE "COMET" CENTENARY EXHIBITION AT GLASGOW.

THE Exhibition of memorials, relics and records bearing upon the subject of the introduction of steam navigation in Europe, as marked especially by the building and putting into service on the Clyde of the steamboat *Comet* in 1812, which has been organized in the Art Galleries and Museum, Kelvingrove, Glasgow, was ceremoniously opened to the public on August 6th by D. M. Stevenson, Esq., Lord Provost of Glasgow. The occasion was further distinguished by an eloquent and highly informative address by Prof. Archibald Barr, of the chair of engineering, Glasgow University, bearing upon the deep debt of gratitude which those of the present day lie under to the early steamship pioneers, as well as upon the measure of credit due to the several pioneers whose names are associated with early experiments, and with the production and working of the *Comet* especially. Since the opening the Exhibition has been well attended by the residents of Glasgow and Clydeside, as well as by "the stranger within the gates" from distant parts of the world.

The collection of exhibits consists of pictures, photographs and other illustrations of early steamboats; portraits of inventors and pioneers, models of steamships of every class and date of build; models and drawings of engines, boilers, and marine machinery generally; personal memorials of inventors and pioneers, and actual relics of notable steamboats and engines of the early days of steam navigation. Altogether between 450 and 460 items are included in the collection, and many of these, particularly in the shape of original documents, throw interesting light on events and stages in the early evolution of the steamship. Of outstanding interest in this connection—apart from what is on view in the way of several models of the river steamboat *Comet*, and of the canal steamboat *Charlotte Dundas*, which after all are fairly familiar objects to the students of this subject, if not to the general public—are a number of documents and relics throwing sidelights on the whole subject which are not so familiar, and in fact have seldom, if ever, before been brought together into such impressive juxtaposition.

Apart from the Exhibition, which will remain open to about the end of the year and admission to which is quite free, the other events to mark the centenary, and which will have taken place by the time this number is in our readers' hands—the banquet and eulogistic address by Mr. J. McKinnon Wood, M.P., Secretary for Scotland, in the Glasgow City Chambers, on Friday, August 30th, and the Shipping Pageant at the Tail of the Bank on Saturday, 31st—give every promise of being worthy of the occasion. Most of the riverian municipalities—Greenock, Port Glasgow, Helensburgh, etc.—are joining with Glasgow in declaring a general trades' holiday, and processions, music and decorative display will everywhere reign. All the prominent shipowners in Glasgow and the West of Scotland have agreed to send vessels to take part in the grand mobilization of shipping off Greenock and Helensburgh. The Admiralty arrangements are as follows:—His Majesty's battleships *Hercules*, *Colossus* and *Monarch* will be anchored off Greenock; the *Orion* and *Agamemnon* off Dunoon; and the protected cruisers *Bristol* and *Falmouth*, with a division of destroyers, off Helensburgh. Vice-Admiral Jellicoe, in command of the Second Squadron Home Fleet, has intimated that every facility will be given for visiting the ships. Between 1,200 and 1,500 guests have been invited—jointly by the Corporation of Glasgow and the Clyde Trustees—to view the display from on board the renowned river steamer *Columba*, of the MacBrayne fleet. The invited company will consist of members of the Corporation, the Clyde Navigation Trust, shipowners, shipbuilders and the executive committee. Others who desire to see the pageant will be catered for by the West of Scotland Branch of the Navy League, who have chartered the new river steamer *Empress Queen*, which will follow in the wake of the *Columba*. In Port Glasgow and Greenock a procession of trades and societies, to the number of about two dozen different bodies, will take place, while in Glasgow, during the evenings of 29th, 30th and 31st, the Tramway Department of the Glasgow Corporation will run over the various routes in the city

specially constructed and illuminated cars commemorative of the celebration.

With a view to establishing an appropriate and efficient memorial to Henry Bell, an appeal is and will continue to be issued to the public for funds for the provision of a suitable steamship for the Royal Technical College, Glasgow, to be utilised for the training of students in the practical work of navigation and engineering, and for the foundation of one or more Henry Bell Scholarships for the College for Shipbuilding and Engineering Research. Already some encouraging donations have been received. At Port Glasgow over £200 has been received from prominent townspeople and others for the establishing of a John Wood (builder of the *Comet*) Scholarship to apprentices in the local engineering and shipbuilding trades. The Town Council, also, have made arrangements for the erecting of a commemorative brass plate at Messrs. Robert Duncan & Co.'s shipyard to mark the birth place of the historic little vessel. On August 24th a memorial to John Robertson, the maker of the *Comet's* engine, was unveiled with due ceremony in his native village of Nolston by Barrhead. It takes the form of an obelisk of granite with suitable inscription.

"TITANIC" ENGINEERING STAFF MEMORIAL.

We append below the amounts collected at the three centres for the *Titanic* Engineers' Memorial Fund :—

Institute of Marine Engineers, London, up to 26th August	£1,820
Southampton Committee (for the erection of a monument in Southampton) up to 20th August ..	913
Liverpool Committee (for the erection of a monument in Liverpool) up to 16th August	3,500
	£6,233

A general memorial fund is being raised in Belfast.

In connection with the Liverpool fund, we are informed that the Finance Committee of the Liverpool Corporation, after considering the application of the Designs and Site Committee, have allotted a site for the Liverpool memorial in the neighbourhood of the landing stage and pier head, so that designs for the memorial can shortly be proceeded with. The Liverpool Committee will not hold any further meetings until the end of September, but in the meantime the Hon. Sec., C. Nelson, Esq., 10, Drury Lane, Liverpool, will furnish any information desired, and the Hon. Treasurer, T. Rowland Hughes, Esq., will receive and acknowledge any donations sent in.

INSTITUTE OF MARINE ENGINEERS.—The proposed syllabus to the end of the year is as follows :—Monday, September 23rd. Discussion, "Modern Developments in the Electro-Deposition of Metals and Alloys." Paper read by Mr. G. P. Lee (Member) at the Non-Ferrous Metals Exhibition on June 22nd. Monday, September 30th.—Fuel Test. Monday, October 7th.—Presidential Address and Presentation of Awards. Monday, October 14th.—Fuel Test. Monday, October 21st.—"Applied Stability of Ships," by Mr. J. H. Heck. Monday, October 28th.—Discussion. Monday, November 4th.—"The Manufacture of Iron and Steel," by Mr. Percy P. Dowden (Member). Friday, November 8th.—Annual Dinner at the Connaught Rooms, Kingsway, W.C. Monday, November 11th.—Discussion. Monday, November 18th.—"The Beginnings of the Marine Engine," by Mr. G. W. Newall (Member). Monday, November 25th.—Discussion. Monday December 2nd.—Discussion, "Wave Motion and Modern Developments in High Frequency Electricity." Paper read by Mr. A. E. Battle (Member) at the Non-Ferrous Metals Exhibition on June 22nd. Monday, December 9th.—Fuel Test. Monday, December 16th.—"The Lessons of Collisions at Sea and some suggestions," by Mr. G. W. Newall (Member). Tuesday, December 31st.—Social Evening for the Junior Section.

MARINE MOTOR NOTES.

WHILE centenary notes and celebrations are in the air, bearing upon the introduction of steam navigation, of gas, of private enterprises and other matters of interest, the internal combustion engine is celebrating itself by gaining a firmer hold in commercial ventures. Recent legislation and statecraft have tended to increase costs in industrial as in other undertakings, making it more difficult "to make ends meet," forcing the small employers out of the field or compelling absorption with larger undertakings where individuality is to a great extent lost. The questions of reduction in running costs and of less employment of labour are therefore of growing importance, hence the keen comparison between steam engines, whether reciprocating or turbine, and the internal combustion engine, is made with due regard to these two questions, now that some data have been obtained from the large motor cargo ships which have been in commission for a sufficient length of time to determine such, it is well, however, to consider other important points in dealing with a comparatively new form of power for marine work. The fuel costs of the *Selandia* have been published with apparent authority, and according to these the cost per mile is about 1s. 7d., while a near counterpart of this ship fitted with steam reciprocating engines is 3s. 4d. per mile, the price of oil being taken at 35s. and of coal at 21s. per ton. The miles run per ton of oil on this basis is 22, while the steamer gives only 5·86 per ton of coal for a speed of 11 knots, results which are not by any means good for a modern steamer of 7,400 tons deadweight. There is a considerable reduction in labour costs in the oil motor ship and other advantages, as the greater cleanliness in receiving fuel on board, but it is difficult to disabuse the mind of the fear that with greater demand for oil, the price would be greatly increased, notwithstanding the assurances to the contrary. Facilities are being increased for the supply of oil at a greater number of ports than hitherto. The amount of lubricating oil is evidently greater in the oil motor ship meantime than in the steamship, where lubricating has become an art and the necessary quantity without waste accurately gauged; this has resulted from experience, study and care, and doubtless the oil motor ship can be similarly gauged to meet the requirements. The Coasting Motor Ship Co., of Glasgow, has a keen observer in Mr. Paton, and the number of vessels now at work and in progress prove that considerable confidence in the oil engine is felt. As different styles of engines are being fitted in the vessels, some of which are built on the East Coast and some on the West, with others about midway between, on the banks of the Forth and Clyde Canal, the data gained will be immensely interesting. The two most recently placed coasters for this firm are in the hands of Messrs. Jeffreys, Alloa-on-the-Forth; they are somewhat smaller than the other fifteen vessels. The inland waterways throughout the country might well be developed with the aid of oil engines fitted to barges. On the continent we see many, both on the rivers and canals,—certainly the canals are more efficiently kept than those of Britain, with few exceptions. Tow boats with oil motors are increasing in number, and the oil-engined pilot boat is more frequently seen around the coast lines; also fishing boats, pleasure yachts and cargo coasters.

IMMINGHAM.—Extensive engineering works are to be constructed at the new port of Immingham, Grimsby, for the Great Central Railway Company, to cope with all classes of ship repairs, etc., and during the past few days the site has been marked out and operations commenced on the foundations. The works are to be erected by the side of the huge graving dock, so that should the Admiralty ultimately decide to construct a Naval dry dock at the port, the engineering works will be immediately between the two, giving facilities for dealing with any class of repairs for any ship which may use the port. Land is being held to-day by the Dock Company in view of the possibility of the Admiralty eventually using the port for Naval purposes.

FOREIGN NOTES.

Bulgaria.

It is reported that the Government has the intention of creating a fleet of warships on the Danube, and very shortly a Bill will be brought before the Chamber of Representatives asking for the grant of the considerable sum required for this purpose.

Canada.

A well-deserved honour has been conferred on Mr. Thos. C. Keefer by the Institution of Civil Engineers, London, whose decision to confer upon him honorary membership has been greatly appreciated by all who know him. He was born at Ontario in 1821 and when seventeen years of age started work in connection with the Erie and Welland Canal, from which undertaking he gradually extended his experience and was engaged in connection with many enterprises tending to open up the country and place the agriculturalist in the most favourable position to reach the markets for his produce, a subject on which he wrote an appreciative paper. He was the first president of the Canadian Society of Civil Engineers. From the time he commenced work Mr. Keefer has been seventy-four years occupied in engineering projects, and in recognition of his length of service, added to the many developments for the good of the country which have been brought about through his instrumentality, the Institution has conferred the honour.

A new shipyard is being laid down at Sydney, Cape Breton, which, it is said, is to excel in size all similar plants in the world, covering over 300 acres, on which launching ways, engineering shops and a dry dock will be built. The dock is to be 1,150 ft. long and 135 ft. broad. In the course of the next three years about 3,000 men will be employed there, and this number will be increased to 8,000 men as soon as the yard is in full swing order.

France.

The s.s. *Umzinto*, of the Royal Mail of Natal Co., the home port of which is in London, has just been acquired by purchase by the firm Castaine of Oran for the North African service. The capacity of the *Umzinto* is 2,800 tons and maintains a speed of 11 knots. The steamer is very commodiously equipped for passenger service and is well provided with all appliances for dealing with the cargo.

The Chantiers de France at Dunkerque have just launched the cargo steamer *Auguste Conseil*, built to the order of the United Shippers of that port. The steamer was launched completely equipped with its machinery of 1,500 i.h.p. The *Auguste Conseil* is of 4,150 tons deadweight.

The Chantiers de la Seyne are constructing a small screw steamer in steel destined for pilot service in the Suez Canal and will be of 100 tons displacement. She will be equipped with an engine of 250 h.p. to give a speed of 10 knots, and will be supplied with a powerful steam pump of 60 tons' output for use at conflagrations. The Compagnie des Chargeurs Réunis has entrusted the Liquid Air Company with the refrigerating installations of their three new cargo steamers. The carbonic acid compressor plant is being constructed according to the plans of the Liverpool Refrigeration Co., Ltd., of Liverpool.

The Compagnie Transatlantique has placed an order with the Chantiers de Normandie for a large twin-screw passenger steamship for the mail service of the line, Havre to the Antilles. The length of this vessel will be 430 m., beam 15.6 m., with a displacement of 9,000 tons. The two engines will develop 4,000 h.p. and give the vessel a speed of 17 knots.

Germany.

While Britain has been celebrating the centenary of steam navigation and associating it with Henry Bell—who was born in Linlithgowshire, near the banks of the Union Canal in April, 1767—Germany has been keenly interested in the centenary in connection with the great firm of Krupp, the founder of whose progressive advancement, Alfred Krupp, was born in April, 1812, at Essen, where the celebrations were held. The Emperor and many prominent men attended the festivities. The present head of the firm, whose marriage to Miss Krupp cemented his connection with the vast enterprise, was honoured by his Imperial visitor when he gave him the historic name of Krupp added to his own, while in his speech he referred to his friendship with former members of the firm and the traditional system of whom he commended in high terms, and under which all their employees received sympathetic consideration and had extended to them many benefits and aids in time of trouble. He also referred in eulogistic terms to the great and admirable work carried on at the establishments under the control of the firm, whose enterprises had been a blessing to the Fatherland. Starting with a small foundry at Essen, Friedrich Krupp, the father of Alfred Krupp, who was born in 1787, had a keen struggle to maintain his business, but was able to hold his own and keep his head above water. He died before his son, who was then but a boy, was able to assist him. Alfred, however, devoted himself with all his energy to the foundry and to his efforts were due the great progress made in the production of steel which brought the firm into prominence. The establishments at Essen and Kiel, besides mining and other industries in various parts, are now so equipped and extended that there are about 100,000 persons employed, and according to the testimony given, the relationship existing between employers and employees is of a high character with harmony and sympathy as the guiding keynote.

The *Elisabeth Brock*, built to the order of the Woermann Line at the shipyard of the Bremen Vulkan at Vegesack, has just been successfully launched. Her dimensions are the following:—Length, 113·38 m.; beam, 15·14, with a carrying capacity of 6,000 tons. This vessel is intended to be used as a passenger and cargo steamer and is accordingly provided with comfortable cabins and saloons, and for dealing with the cargo there are a number of appliances specially adapted for the West Coast of Africa. There will also be some surf boats on board of specially strong build. A quadruple-expansion engine of 2,000 i.h.p. will give the *Elisabeth Brock* a speed of 11 knots.

The Hamburg-America Line has installed a very powerful electric searchlight of 80,000 candle power on its liner *Kaiserin Auguste Victoria*, which throws its light to a distance of five miles. The Hamburg-America Line has placed an order for a new tank steamer of 1,500 tons carrying capacity, which will employ oil fuel for its motors of 450 h.p.

At the Bremen Vulcan shipyard at Vegesack the *Renata Amsinck*, a passenger and cargo steamer built to the order of the Woermann Line, was successfully launched. This steamer is destined for the trade of the West Coast of Africa and carries a number of surf boats for landing purposes. Her engine develops 2,000 i.h.p., and is of the quadruple-expansion type; her speed is to be 11 knots. The accommodation for passengers, officers and crew are of a suitably substantial nature, provided with all appliances for comfort in hot climates. A large number of winches, etc., will be able to deal effectively and rapidly with the cargo of 6,000 tons of manufactured and other goods.

The cargo steamer *Palatia*, built to the order of the Hamburg-America Line, of 6,500 tons, has recently passed through her trials satisfactorily and easily attained her contract speed of 11 knots.

The shipyard and dock of Messrs. Brandenberg will pass into the hands of the Reiherstieg Shipyard and Engineering Works on the 1st of October. The purchasing company is said to be in close relationship with the North German Bank. Great activity will be the result of this transaction at both the yards mentioned.

Greece.

The order for the battleship mentioned in our last issue has now also followed the torpedo boats, and gone to the Vulcan Shipyard, Hamburg, Bremen. The success of the German firm has by all reports been due to financial considerations afforded by this firm in connection with German banks.

The question, "What's in a name?" was brought to our notice recently when the men were being engaged to work on board a steamer built for the Netherlands Steamship Co. on the West of Scotland, and named *Charon*. The association of ideas between the ancient ferryman whose occupation on the Stygian waters was at best not a savory one to be continually reminded of, and the daily work of loading and unloading a modern vessel might not trouble an unimagina-

[illegible] wd of London, lockers but [illegible] the land near where Horace and Virgil dwelt, the name was looked upon as uncanny, and the men declined to work on board. Still maintaining the classics for choice of a substitute to *Charon*, that of *Jason* was given to the vessel in order to meet the objection—surely a change wide enough to please the most tasteless, and of which all hands ought to be proud, while the owners should congratulate themselves on what may be prophetic of the golden harvest to be reaped by the steamer.

Portugal.

The Senate has passed the necessary sums for the construction of the following ships, namely, six destroyers of 800 tons, three submarines of 243 to 300 tons, one submarine auxiliary boat of 800 tons, two cruisers of 2,500 tons. The cruisers are to be completed in twenty months and the other ships within fifteen months.

Russia.

The Duma has now passed 502 million roubles for the reconstruction of the Imperial fleet. 302 millions will be used for armoured cruisers, eight small cruisers (of which four are for the Baltic Sea, two for the Black Sea and two for the Siberian fleet), thirty-six torpedo boats for the Baltic and eighteen submarines, twelve of these for the Baltic and six for the Siberian fleet. A sum of 144 million roubles will be spent for auxiliary ships. On the improvement of docks 13 million roubles will be spent, including several floating large docks. A further sum of over 100 million roubles will be used for extensions of all the chief ports, including machinery for various purposes, such as cranes, steam winches, etc. The port of Reval will alone absorb over 75 millions of the last-named sum.

The impending realization of the ship construction programme has produced a very active movement in Russian industrial circles. At the Nikopol-Marinpol Works enormous plant is being laid down for the manufacture of armour plates, for which machinery is being bought from abroad.

A NEW 32,000-TON FLOATING DOCK.

ON August 14th, there was successfully launched from the shipbuilding and engineering works of Messrs. Cammell, Laird & Co., Tranmere, one of the largest floating docks yet constructed, and it was at once taken in tow for Portsmouth, where it will be stationed. Its lifting capacity is 32,000 tons and it will be used for docking the largest battleships. At 11.30 a.m. about ten tugs of the "Cock Line" made fast to the huge structure and began towing. At 12.2 p.m. the dock was water-borne. It may be mentioned that the dam had been removed overnight, allowing the water to flood the mud dock in which the construction had been carried on. The towage arrangements were that the tugs, *Black Cock* and *Sarah Joliffe* should attach hawsers to the dock, while the *T. A. Joliffe* was ahead of the *Sarah Joliffe* and the *Storm Cock* led the *Black Cock*. The dock is of the box type and some idea of its bulk may be gathered from the following dimensions:—Overall length, 680 ft.; width, 144 ft. The side towers are 66 ft. high from bottom of pontoon, the floor area of which is 2¼ acres. The total displacement when the dock is submerged to take a vessel drawing 36 ft. is 40,000 tons. The pontoon and sides are divided by longitudinal and transverse water-tight bulkheads, each section having its own set of valves, etc. The control is the Westinghouse electric pneumatic and is centred in a valve house. The steam is generated by eight Babcock & Wilcox boilers with a working pressure of 155 lbs. The pumping plant consists of eight compound centrifugal pumps of Messrs. Gwynne's make. This plant, together with dynamos and pneumatic plant, occupy the port side, while extensive workshops, together with half of the pumping plant, is fitted up in the starboard side. The dock is capable of raising a vessel of 32,000 tons displacement and 36 ft. draught in five hours.

THE OPTICAL CONVENTION AND EXHIBITION of Optical and Allied Instruments opened on the 19th of June and continued until the 26th. Many papers were read and visits paid to various works and factories. On the 24th of June a party went over the National Physical Laboratory, Teddington.

AN INEXPENSIVE FORM OF EXPERIMENTAL TANK.

THERE are two standpoints from which the resistance of a vessel on its passage through the water may be viewed: one, known as Euler's method, in which the water is at rest and the vessel moving; the other in which the vessel is considered to be at rest and the water flowing past, is known as Lagrange's method. As the relative motion is the same in both cases, the force required to tow a model through the water at a certain speed will be the same as that required to hold it stationary when the water is flowing past at the same speed.

Euler's method is embodied in the large towing tanks at Haslar, the National Physical Laboratory, etc. These are necessarily few in number, owing to their great initial cost, also cost of maintenance.

Experimenters of moderate means look to Legrange's method as more likely to be within their reach, and naturally conceive of a stream of water kept circulating in an endless channel by means of a pump. Such a plant has been laid down in several places, and Dr. Stanton, of the National Physical Laboratory, in a paper read before the Institution of Naval Architects in 1909, gave a description of his apparatus. This tank had an effective channel 12 inches broad and 7 inches deep, and the results obtained, on experimenting with small plates, were wonderfully good; showing that such small-scale experiments are of value, and that with a larger channel even ship-models could be experimented on with success. A similar but much enlarged tank, with a cross section of 5 feet by 3½ feet, has been laid down in the National Physical Laboratory.

Again, however, the expense of even the smaller of the two equipments is prohibitive to the private experimenter, and it is hoped that the tank described below will meet the case with comparatively small outlay, even for tanks of cross section as great as that last mentioned. A tank of approximately this cross section was very successful, but not being wanted for experimental purposes, had no mechanism by means of which the velocity of the current could be varied.

The problem, a solution of which is sought below, is to circulate cheaply a fixed quantity of water with steady flow in a closed circuit, also, if possible, to vary the speed of flow at will.

The following is a description of a small-sized tank, and the adaptation of details to a tank of any desired size is left to the individual designer.

The water starts at a high level at A, Fig. 1, and flows down to B, being steadily accelerated if the slope be sufficient, and acquiring a velocity nearly proportional to the loss of head. Through the portion D to E used for experimenting, the water flows with uniform velocity, the slope of this part being sufficient to make the acceleration due to gravity exactly equal to the retardation due to the friction of the channel. This slope will have to be altered with each velocity, as the friction varies approximately as the square of the speed, and there must be a corresponding alteration in the force overcoming the friction. This force is the component parallel to the free surface of the weight of the water. The fall from F to G is sufficient to carry the water away from the straight channel at

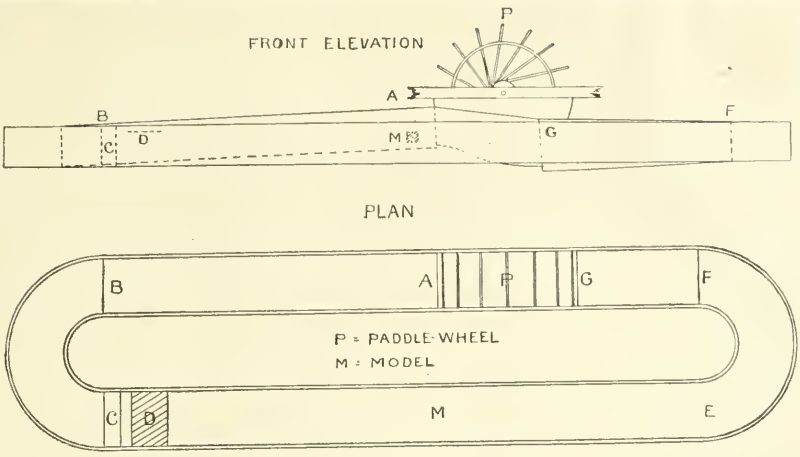


Fig. 1.

the rate required to maintain continuity of flow—a constant quantity of water in DE.

The problem resolves itself into that of raising the water from G to A in some inexpensive manner, so that the cycle may recommence. This difficulty is simply disposed of by fitting a paddle-wheel between G and A, with but a small clearance between its floats and the sides and bottom of the channel, so that it may spoon the liquid from the lower to the higher level. In a small apparatus the paddle-wheel may be turned by a handle, if no other power is available, the motion being slow, and no great accuracy being required in maintaining the head at A. In large plants the wheel may be keyed to the end of any available shaft, as it uses but a small amount of power.

To steady the flow before it enters the straight at D, two sheets of wire gauze (C) are fitted vertically, and to eliminate surface waves, a plate (D) is fitted horizontally on the surface of the water, which plate is adjustable as to height. The speed of flow can be altered by altering the head—the difference in height between A and B. To do this we must have flexible joints at B and F, constructed as follows:—

Joint at B: Out of each side of the channel a V-shaped notch is cut (Fig. 2), with sufficient spread to allow of the maximum lift being given to the movable part, AB. This notch is made watertight by being covered by a piece of leather. As the movable part AB is swung upwards about H to increase the head, the leather would no longer be taut and flush with the sides of the channel, but would form a pocket, which would interfere with the flow of the stream. To get a smoothly-flowing stream in all cases, a piece of tin, flat with the sides of the tank, and covering the notch is fitted. A flexible watertight hinge is made in the sole of the channel by a strip of tin.

Joint at F: What has been said for the joint at B holds for that at F, except that in the latter case the leather is taut in the maximum head position. The connection between the movable ends at A and G is best made by sheets of rubber for the sides, as the shape of the gap alters to a considerable extent, and tin for the bottom. It will be noted that at G the height of the sides is much greater than at A; this prevents overflow when, at the position of maximum head, the paddle-wheel is stationary.

The paddle-wheel can be quite crude, its function being simply to trap water between a pair of consecutive vanes, to lift it up and deposit it at the higher level. The only thing we require to be careful about is the clearance. The angle of the floats should be 30 degrees in advance of the radius, in the direction of turning (Fig. 3), and the floats themselves would be much improved were they made after the fashion of those in a Poncelet wheel, but this is not worth while for small tanks. In order that the flexible tin bottom fitted in way of the wheel may have the same

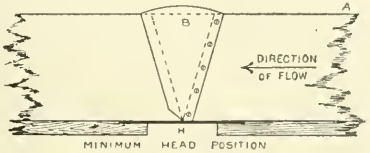


Fig. 2.

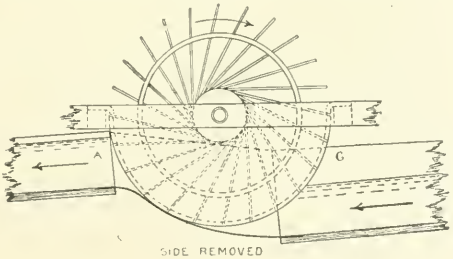


Fig 3.

clearance between it and the paddle-wheel for all differences of level between A and G, two curved strips of iron (Fig. 3), are fixed concentrically with the paddle-wheel. The outside radius of each strip is great enough to give the desired clearance when round these bands of iron the flexible bottom wraps. To accommodate these strips, small portions are cut out of the corners of the floats. The paddle-wheel and the concentric bands do not vary their height with A and G, but are fixed in space. To the sides of the clearance bands is soldered a sheet of tin which fits tightly against the sides of the channel. This maintains a constant clearance between the floats and the sides, even though the mutual closing in of A and G should cause the rubber portion of each side to form a pocket.

To get greater velocities of flow than that due to the maximum head allowed for, a throttling channel may be fitted inside the straight channel DE. This is only applicable to large sectioned channels, and for models so small that the closed-in sides will not affect their stream-lines. The throttling channel

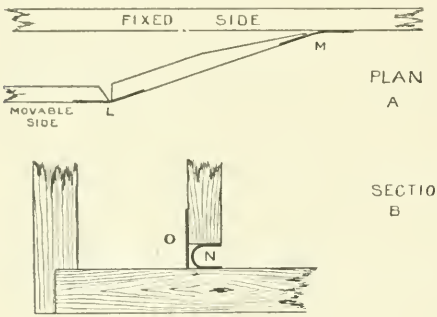


Fig. 4

takes the form of inner sides which can be made to approach one another so as to narrow down the channel and increase the speed of flow. The ends of these movable sides are made as shown in plan (Fig. 4), where we have a leather hinge at L, also a leather strip (M) at the end of the flap connecting the inner and outer sides. To make the lower edge of the movable side watertight, fasten to it a strip of leather (N) bent into a U-section as shown, Fig. 4. In order that the free part of the leather may not be pushed through as the side is moved towards the centre of the channel, a plate (O) is fastened as shown.

The elevation of A and depression of G, together with the adjustment of the movable sides in DE, can be made by means of screws with butterfly heads.

The resistance of any model can be measured by a weighing machine, similar to that used by Dr. Stanton, and described in the paper mentioned above.

The speed of flow is obtained by two tubes described in the same paper; one a static pressure tube, giving the pressure at any point due to its depth alone, and the other a Pitot tube, showing the pressure due to the depth and the velocity. The difference between the levels of the water in the two tubes is a measure of the velocity of the stream.

NAVAL MATTERS PAST AND PROSPECTIVE.

(From our Own Correspondent.)

Portsmouth Dockyard.

On July 30th, Admiral Sir Arthur Moore struck his flag as Commander in Chief at this port and retired from the Navy, his successor being Admiral Sir Hedworth Meux. One of the new Commander in Chief's first duties was to receive the King and Queen, who arrived on August 3rd and went on board the *Victoria and Albert*, the Admiral and Lady Meux subsequently taking luncheon with their Majesties. In the afternoon the yacht proceeded to Cowes and remained there for a week. The harbour after the departure of the fleet for the manœuvres presented a deserted aspect, but things have now resumed their normal appearance. During the absence of the ships several battle-practice targets were repaired. The battleship *Revenge*, seagoing tender to the Gunnery School, is having some alterations made to her magazines and shell rooms, so as to bring them up-to-date. The battleship *King George V.* is making satisfactory progress towards completion. Nearly all her armour and casemates have been placed in position, and the vessel is almost ready to receive her 13·5-inch guns. The steam and gunnery trials are to take place during the autumn. The *Iron Duke* is also making good progress. Her construction has reached the upper deck and a good deal of the inside work has been done. The battleships *Zealandia* and *Hindustan* have had temporary repairs made to their damaged net shelves, etc., caused by a slight collision at night during the manœuvres. The completion of the repairs has been postponed until the vessels come in for their annual refit in a few months' time. The lengthening of No. 14 Dock, for which £10,000 out of a total of £160,000 has been provided in the Supplementary Estimates, will, when completed, provide us with another "Dreadnought" dock. At present we have only one dock in which a super-"Dreadnought" can be placed—No. 15, which was lengthened some fifteen feet a few years ago, and which now measures 578 ft. over all and 572 ft. over the blocks, with a width of 94 ft. at the entrance and a depth on the sill of 33½ ft. at high water. No. 14, which is 559 ft. long, with a width at the entrance of 82 ft., is to be made the same size. The new lock, which will soon be available, has a length of 850 ft., with a width at the entrance of 110 ft. and a depth on the sill of 35 ft. Alongside of it a new dock is being constructed—No. 16—which will be 1,000 ft. long over all and 950 ft. over the blocks, with an entrance 100 ft. wide. When this is completed we shall have four docks available for the largest warships, in addition to the floating dock which has arrived from Birkenhead. The floating dock is said to be the largest of its kind in the world. It will be about two years before all five docks will be available. The death has taken place in Germany of Engineer-Rear-Admiral J. Corner, who retired three years ago, after having been head of the engineering department here for twenty-one years. The results of the examination for entry as apprentices and boy shipwrights in the dockyards show that Portsmouth has the honour of having the top boy, who obtained 1,340 marks out of 1,500, beating a Devonport boy by the narrow margin of one mark.

Devonport Dockyard.

The construction of the battleship *Marlborough*, which has now been in hand for seven months, has made good progress during the past few weeks. No time was lost in handling the massive rudder and stern-post castings when they were received from the contractors, the delay in delivery of which retarded somewhat the stern section. These fittings are now in position, and the curved side frames have been fixed to the stern-post. With regard to the battleship *Centurion*, the armour plating for the conning towers has been delivered. The foremost tower will be of an enlarged pattern, so constructed as to serve as a fire-control and Whitehead observation station, and the after one, of smaller dimensions, will serve as an observation and Whitehead control station for the stern fire. The grouping of the forward armour forms a combination of exceptional strength, and presents either inclined or curved surfaces to practically

all angles of fire, the centre of the combination being occupied by the 13·5-inch barbette redoubt. The first consignment of the 13·5-inch guns has been delivered. They are of the improved design, firing 1,400 lb. projectiles, and are the first of the type to be received. The battleship *Thunderer* arrived on August 2nd from Sheerness to give manœuvre leave and to complete with coal and stores, and on the 7th Vice-Admiral Sir Percy Scott visited the ship and inspected his fire director. A week later the Admiral rejoined the vessel, which left for a cruise, during which the invention was to be tested under service conditions. Rear-Admiral R. H. Peirse, another former Inspector of Target Practice, was also on board for the trials. The *Thunderer* is the second battleship to be turnished with the director. The *Neptune* was the first so fitted, and exhaustive trials last year afforded proof that the apparatus tends to accuracy and rapidity of fire control. Since then Sir Percy has made a few alterations in it. The battleship *Princess Royal*, built by Messrs. Vickers, Son & Maxim, arrived from Barrow on August 16th and was dry docked. She is to begin on September 2nd a series of tests which will be continued until the 21st. The full power trial is to take place on the 12th. The battleship *Victorious* had her propellor shaft damaged in collision with the battleship *Majestic* during the manœuvres, and came in towards the end of July, but she did not remain very long. It has been announced that the Admiralty have made a supplementary grant of £3,000 for wages for the purpose of converting the cruiser *Powerful* into an overflow ship for the *Impregnable* training establishment. This permits of the entry of about 150 men.

Chatham Dockyard.

The first keel plate of the protected second-class cruiser, *Lowestoft* was laid on July 29th in No. 8 slip, from which the *Chatham* was launched last November. Mrs. Ommanney, wife of the admiral-superintendent, drove the first rivet by means of a pneumatic riveter, rivets also being driven by the Mayor of Gillingham and a number of ladies and gentlemen. Previously to the laying of the keel plate Admiral and Mrs. Ommanney entertained the principal officers of the yard and their wives at luncheon. This was also a farewell banquet, as on August 9th Admiral Ommanney was succeeded by Rear-Admiral C. Anson. The *Lowestoft* is somewhat similar in design to the *Chatham*, but she will have a displacement of 40 more tons and will carry an additional 6-inch gun forward. She will be 430 ft. in length, and will have a breadth of 47 ft. 10 in., while her speed is expected to be 25 knots. With regard to the *Chatham*, there has been delay on the part of the Thames Ironworks Company in delivering the propelling machinery, and it will probably be late in the year before the vessel is commissioned. After consultation with Captain Drury Lowe, the commanding officer, the Mayor of Chatham and his committee have decided that the borough's gift to the vessel shall take the form of a large ship's bell in silver, and the cost of this is being defrayed by public subscriptions. The battleship *St. Vincent*, flagship of Rear-Admiral Madden, First Battle Squadron, arrived on August 1st, and was taken through the North Lock into the steam basin for refit. The *St. Vincent* is the first battleship of the "Dreadnought" era to enter the yard, and her presence is due to the fact that with the new Medway floating dock we are now in a position to undertake the refits of battleships of the new type. The greater portion of the refit will be carried out while the ship remains in the basin, but any work to the underwater fittings will be left over until the vessel is placed in the floating dock. The cruiser *Topaze*, senior officer's ship in the Sixth Destroyer Flotilla, was paid off on July 31st for a retubing refit, and the cruiser *Minerva* has temporarily taken her place. Captain M. Silver shortly after leaving the *Topaze* went to Messrs. Cammell, Laird & Co.'s to take command of the new cruiser *Melbourne*, which they are completing for the Royal Australian Navy. The battleship *Commonwealth* arrived on July 29th to refit, but not much required to be done, and she was soon out of hand. The cruiser *Hogue* was paid off on August 3rd for an extensive refit, and a week later the flotilla cruisers *Patrol*, *Forward* and *Foresight* arrived to pay off for refit and also to rearm with 4 inch quick-firing guns in place of their 12-prs. The destroyers *Mosquito* and *Maori* have arrived, the former for refit and the latter for docking. The steam basin being rather congested, the cruisers *Juno*, *Astraea* and *Charybdis*, of the Third Fleet, have been berthed in the Medway, off Folly Point. The cruiser *Boadicea* has left to rejoin the Third Destroyer Flotilla. While here she had her mainmast lifted out, and she has now only a foremast like the later vessels of the class. The battleship *Lord Nelson* is ordered to arrive for her annual refit on September 4th.

Sheerness Dockyard.

The official test of the lifting powers of No. 4 floating dock, which has been built on the Tyne at a cost of £23,416 for service at Dover in docking submarines, took place on July 31st. The dock is designed to to lift 1,500 tons, and the ocean-going destroyer *Amazon*, which was floated into the dock after it had been submerged, has a displacement of 970 tons. The destroyer was lifted without any difficulty. The surveying vessel *Endeavour* was commissioned on August 6th by Captain E. Hardy, for service in the re-survey of the Shetland Islands. A few days later the vessel proceeded to Harwich, where she embarked Rear-Admiral H. Purey Cust, the Hydrographer of the Navy. The destroyer *Itchen* has completed her refit, and has left to rejoin the Fifth Flotilla in Scottish waters. The battleship *Formidable*, which is to act as countmg ship for the battle practice of the Home Fleets and the Mediterranean Cruiser Squadron, left on August 13th for Portsmouth to embark officials from the department of the Inspector of Target Practice. The steam mooring lighters *Resource* and *Recovery* are ordered to be prepared here for service at the new dockyard port of Rosyth. The *Ganges*, which has been employed for some years in connection with the boy's training establishment at Harwich, has been brought in for refit. Originally the cruiser *Caroline*, she was launched at this yard in November, 1882. On the completion of the alterations she will be towed back to Harwich. It is satisfactory to find that Sheerness is doing better in the entry examination for apprentices. Two years ago only four of the boys obtained over 1,000 marks, and the first Sheerness lad was 161 down the list. This year sixteen of our boys gained over 1,000 marks, and the first Sheerness lad was tenth on the list. This is a great improvement, and is due in some measure to the new higher elementary school opened eighteen months ago. It is interesting to note that quite a number of Sheerness apprentices have risen to high positions. There is Mr. W. Berry, chief constructor at Malta, who has been appointed Assistant Director of Naval Construction in succession to Mr. W. Whiting, who is to be the new Superintendent of Construction Accounts and Contract Work. Sir E. Reed and Sir N. Barnaby were Sheerness apprentices, and several members of the Royal Corps of Naval Constructors commenced their careers here. Mr. A. Richards and Mr. J. Apsey, the constructive managers at Devonport and Portsmouth respectively, and Mr. H. Pledge, chief constructor at Pembroke, were all shipwright apprentices at Sheerness.

Pembroke Dockyard.

The cruiser *Nottingham* is making fair progress, but she will have to be pushed on much more rapidly if she is to take the water before the end of the year, as it was stated the intention was when the keel was laid. A fair idea of what the vessel will be like can now be formed. She appears to be in most respects similar to the smaller vessels of the *Boadicea* class, but the *Nottingham* is longer and wider, and the materials used in building her are rather heavier than in the previous vessels. The lower coal bunkers, too, seem to be very small, this probably being in consequence of the large amount of space necessary for the boiler rooms. Probably by the time these lines are in print the turbines of the *Amphion* will have been delivered. This should permit of the vessel being closed in and almost completed by the end of September. The turbines, which are the first of a new type, will be delivered almost intact, the weight to be lifted, in the case of the two which form the first set, being over ninety tons. The steam trials of the *Amphion* will probably take place in December. The delay in the delivery of the turbines, which has extended to eight months, is to be regretted, as it will no doubt increase the cost of the vessel. The laying down of the new light armoured cruiser will, it is understood, take place at an earlier period of the year than was at first intended. The specifications have been prepared, and the two vessels to be built at this yard and at Chatham will, it is stated, be ordered shortly. In a recent statement the First

hold of the Admiralty announced that the Admiralty intended to base a cruiser squadron at Haulbowline, and probably another at Pembroke Dock. This would appear as if the Admiralty are at last recognising that Milford Haven is a port of importance for the defence of commerce on the West Coast. They have held the opinion in the past, it is evident, from the fact that during manœuvres a defending fleet has been based on Milford Haven on more than one occasion. It is to be hoped that the basing of a squadron here will be an accomplished fact in the near future. The full-power trial of the propelling and other machinery of the destroyer *Wolf* was successfully carried out after her retubing refit and the vessel subsequently proceeded to Devonport. As the result of the completion of the *Wolf* the *Ouse* has been taken in hand.

THE "TITANIC" ENQUIRY.—We have received a reprint, in book form, of the report published by "The Journal of Commerce" relating to the British official enquiry into the circumstances attending the loss of the s.s. *Titanic*, which was held at the Scottish Hall, Westminster, under the presidency of Lord Mersey. In addition to the full report of the evidence and the speeches of Counsel, photographic representations and personal accounts are given of some of the leading individuals in the matter, including Captain Smith and three of the officers who went down with him. The book certainly affords a very concise and compact history of the catastrophe, and should prove most useful to those who wish to go into the details thoroughly.

STEAM TO NEW YORK.—References to the *Comet* and other of the early steamboats reminds us of the first attempt to cross from Britain to America by steam in 1838, when the *Sirius*, about 180 ft. long, steamed under some disability for want of sufficient coal for the run—to New York in about nineteen days. She was closely followed by the *Great Western*, which occupied less time in the crossing by four to five days, both vessels arriving the same day. The *Sirius* was lost in the Irish Channel when nearly ten years old, having been built at Leith in 1837. It may be remembered that the wreck was salved some fourteen years ago and souvenirs made from one of the gun-metal pump rods; on these was inscribed a brief sketch of the vessel's interesting history.

A HOME AND SCHOOLING FOR THE CHILDREN OF MARINE ENGINEERS.—An esteemed correspondent in the Far East has advocated the founding or establishing of a home and arrangements for the education of children of marine engineers whose duties demand their location in lands where children cannot receive that training and education which their parents desire them to have. Many children are sent home to boarding houses or schools, and in some cases the fathers have but little knowledge of those to whom the care of the children is entrusted, dependent as they are upon information from circulars or correspondence. One case is cited where one child was not by any means done justice to in regard to education, in spite of high fees for board and schooling and of reports giving glowing results year by year. The father only discovered when his daughter joined him after some years how he had been deceived. The suggestion has occurred on account of the *Titanic* Engineering Staff Memorial, and the correspondence in connection with it. If a home for orphans of marine engineers could be founded as a memorial, it might be extended to serve as a boarding home with school arrangements for children of marine engineers serving in foreign waters or located in the marine engineering workshops ashore. The boarding home would form a paying part of the establishment, and yearly subscriptions from marine engineers all over the world would cover the payments for the orphans. The contributions to the Memorial are swelling the amount in the hands of the Institute of Marine Engineers, as pointed out by our correspondent, and in his enthusiasm he anticipates a large sum will be gathered, sufficient to form the nucleus of a fund to establish a home which will be looked upon with pride and satisfaction by all marine engineers throughout the world, a home to which they could with confidence send their own children in the consciousness that their education and training would be entrusted to true and faithful hands.

THE SABATHÉ MARINE OIL ENGINE.

IN the Sabathé engine described below we have a type of marine residue oil consuming engine that is distinct from all other oil engines, and although the pure Diesel class can be said to have a remarkably low fuel consumption, the engine in question has been proved to be even more economical, as its consumption of heavy Russian oil has been brought down as low as ·392 lbs. per b.h.p. per hour against ·430 lbs., the lowest yet attained by any ordinary marine Diesel. This has been obtained by the adoption of a system giving combustion at constant volume and at constant pressure, whereas the pure Diesel operates under constant pressure only. So it will be seen that the Sabathé engine is an improved development of the Diesel. Combustion is, of course, by heat developed by compression alone, no hot-pot, tube or electrical ignition gear being required. The designers and builders of this novel engine are the Société des Moteurs Sabathé, of Usines de la Chaléassière, St. Etienne, a firm of repute in France that have already fitted a number of submarines of the French Navy and yachts. The fuel consumptions given were taken during official tests of a large engine built for the French Government. The Sabathé engine is of the reversible four-stroke type, so, of course, the cycle of operation is as follows, First, air suction; second, compression; third, fuel injection and combustion; fourth, scavenging.

We are able to illustrate two marine engines, Figs. 1 and 2, one of 40 h.p. at 600 r.p.m. and one of 500 h.p. at 400 r.p.m., which are two excellent examples of Sabathé design. The sizes constructed range from a two-cylinder 10 h.p. model, to an eight-cylinder engine of 6,000 h.p., although we understand that the largest engine actually constructed and tested has four cylinders and is of 700 b.h.p., or 175 h.p., per cylinder, which is no mean power, when one considers that the engines of the famous 9,800-ton ships *Selandia* and her sister motor ships only develop 156 h.p. per cylinder.

The 500 h.p. engine illustrated has a fuel consumption per brake-horse-power of 178 grams (one gram equalling ·035 ounces avoirdupois) at the normal running speed of 400 revs. per minute, that is to say, a total consumption of 1 cwt. 83 lbs. 9 ozs. per hour. At 350 r.p.m. the engine develops 300 b.h.p. with a fuel consumption of 179 grams per b.h.p. hour, or 1 cwt. 6 lbs. 6 ozs. per hour. On dropping the engine speed to 250 r.p.m. the power given is 110 b.h.p. and the fuel consumption increases per b.h.p. hour to 200 grams, but the total hourly consumption at this speed is only 43 lbs. 2½ ozs., partly due to the great reduction of power. So it will be seen that although the proportionate consumption at low speeds is higher, the engine is remarkably economical when running slowly. Taking residue oil at threepence per gallon the 500 h.p. Sabathé engine costs but 12s. per hour to run at full speed; while at 250 revs. per minute, the cost is only 3s. per hour's running.

In addition to the 500 h.p. Sabathé engine, we are enabled to give illustrations of the 40 b.h.p. model, which being the engine of an auxiliary yacht, will doubtless be also of interest, especially as it is not very well known that high-compression marine oil engines can be obtained in very low powers. Sabathé engines are built down to 10 h.p., and up to 6,000 h.p., as before mentioned. During a four-hour test of this engine 42 b.h.p. was developed at an average speed of 575 r.p.m., the fuel consumption of heavy Russian residue oil being 9,156 grams (about 1¾ gallons), whereas a petrol or paraffin engine of this power would require at least four gallons per hour, so the economy is apparent, especially as the lighter fuels are more expensive. Against this, of course, must be weighed the higher cost of the Diesel type of engine, but it must be remembered that the fuel cost us under 6d. per hour.

Now let us turn to the working and constructional details of the 500 h.p. Sabathé marine engine. It is directly reversible and operates on the four-cycle type, figure 3 showing a section of one of the cylinders, which, it will be noted, are fitted with steel liners. To overcome frictional troubles the pistons have several broad white-metal bands in addition to five cast-iron piston rings. In the head of each cylinder there are four valves, namely, atmospheric air inlet valve, exhaust valve, air starting valve and fuel injection valve, all of which are operated by rockers from a cam-shaft on the

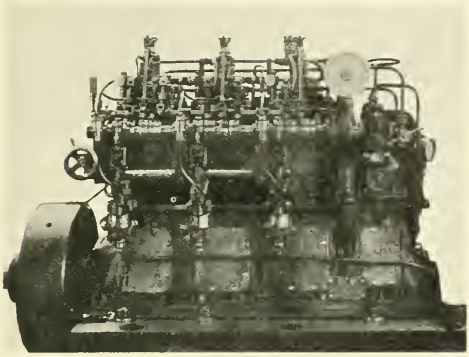


Fig. 1.

40 H.P. Sabathé Engine.

starboard side. There are two sets of cams, one for the ahead motion and the other for the astern movement, and both sets form a sleeve on the cam-shaft, the sleeve being moved lengthwise for reversing by means of a hand wheel; but first the rollers of the valve rockers are lifted from the cams by means of a lay-shaft operated by compressed air. A three-stage compressor, supplies air to storage tanks, for fuel injection, starting and reversing. The pistons can be removed through the doors in the crank case.

Turning to figure 4 the general arrangement of the fuel injection valve is shown. This is of unique and ingenious design and deserves special attention. On the first downstroke of the piston, air is drawn into the cylinder, and on the up-stroke it is compressed to 400 lbs. per square inch, while just as the crank turns over the dead centre *fuel is injected in two stages*, this being done as follows:—Oil is forced from plunger-type fuel pumps, to the two chambers (G) and (E) through the passages (B) and (J). Just as the piston almost reaches the top of the stroke the fuel valve (A) is lifted by means of the cam (P) the motion being affected by the rocker (Q) and the rod (R) and the fuel in the chamber (G) is injected

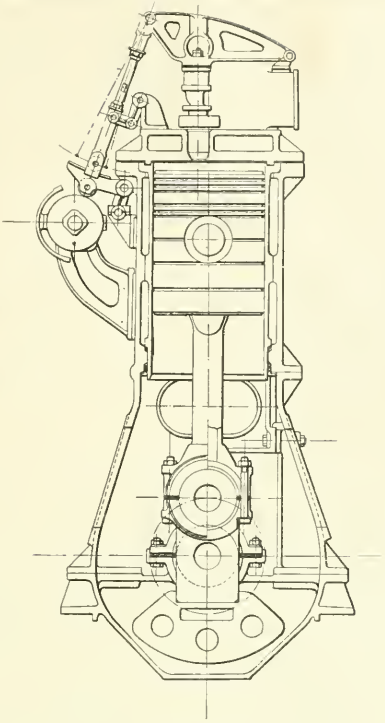


Fig. 3.

Cross Section of 500 H.P. Sabathé Engine.

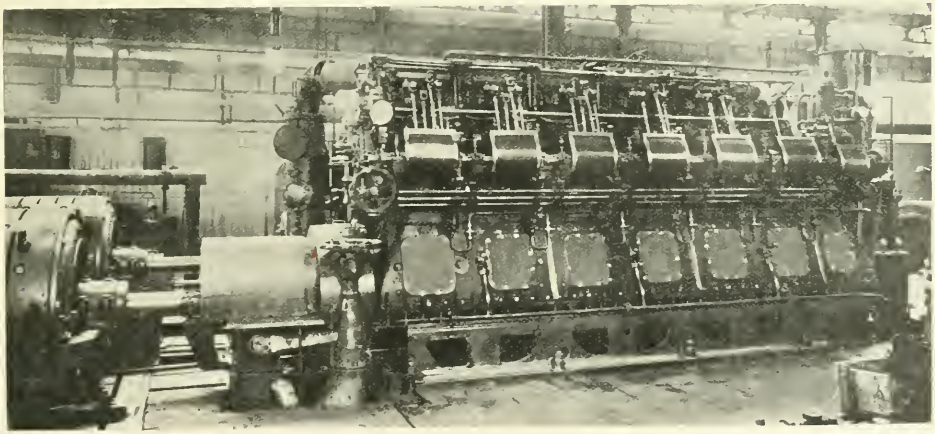


Fig. 2.

500 H.P. Sabathé Engine.

[illegible] the latter [illegible] at D. On the valve stem (X) are [illegible] (F) which is the valve (A) lifts raise the valve (S) [illegible] the fuel in the chamber (E) is also injected against the pressure of course into the cylinder which is already in a state of combustion at constant volume, the stroke continuing at constant pressure. The two separate fuel injections follow very rapidly after each other the *first* [illegible] *to 580 lbs per square inch.* The valve (A) is closed by the spring (V), while the valve (S) is closed by the spring (N).

Next to the small lever (K) the governor is attached, also the engine speed control. By moving this lever, the rod (R) is caused to slide on the saddle (M) and its position varies the movement of the cam (O) and consequently the lift of the valve (A). This at slow speeds the valve (A) does not lift sufficiently to raise the valve (S), so that only the small quantity of fuel in the chamber (G) is injected. This partially accounts for the economy of the consumption. This system of injecting the fuel in two separate charges gives combustion first at constant pressure and then at constant volume, the advantage of which is proved by the results obtained. It is interesting to remember that the French Government has adopted Sabathé engines for naval craft, and in consequence of being busily engaged on this class of work, the makers have not up to the present done very much with regard to pleasure and commercial vessels.

THE FLEETS OF THE MAIL LINES.

American Legislation and the Shipping Interest.

WHEN we at home are tempted—as, indeed, we often are—to find fault with Parliament and the Board of Trade for what appears to be its unnecessary interference with the shipping interest, we may usefully remember that they do not manage these things much, if any, better abroad. The master of an Italian passenger steamship, the *Principe di Piemonte*, has just been sent to prison and fined for disobedience to the provisions of the Federal Passenger Act of the United States, in that his ship was not provided with proper tables and chairs for the use of the steerage passengers whom she carried. Captain Domenicom, the defendant, argued that the steerage passengers whom his vessel carried, being Italians, had no use for tables and chairs, as they preferred to eat their meals seated on the deck of the vessel. The Court agreed that the master was right in his contention, but it held that the obligation of the Act of Congress was absolute, and that, the law having been broken, in that tables and chairs had not been provided for those who admittedly had no use for them, the defendant must be punished. It accordingly inflicted what it evidently considered a nominal sentence, and fined the Captain ten dollars with fifteen minutes' imprisonment. Fifteen minutes' imprisonment can only stand as a kind of joke in some persons' minds. It is certainly calculated to do the reputation of American justice more harm than it could inflict on the prisoner. Yet at the same time it is not fair that on account of a mere technicality, committed, not by him at all, but by his owners who were far away from the jurisdiction, a reputable professional man should be sent to prison at all. Meanwhile American imprisonment may be said to have been treated as a mere practical joke by those who are appointed to administer it. We manage things better in England, for though our Courts fine the master for offences connected with want of legal equipment, when we cannot get hold of the owner, we make it clearly understood that the owners should, in the event, pay the fine.

What promises—unless it be speedily remedied—to be a serious state of things for the British Mercantile marine has arisen in regard to the United States Bill for the regulation of the Panama Canal, now so rapidly approaching completion. As a great power in North America and in the West Indies, as well as in respect of her trade and shipping, Britain was vitally interested in the proposals for the construction of an Isthmian canal. By the Hay-Pauncefote treaty it was agreed between the two powers that the United States should build the waterway, but that she should put vessels of all nationalities on an equal footing in regard to its use. This solemn obligation having been ratified, and the work of construction having been nearly accomplished, the Congress of the United States now proposes to favour its own shipping by the system of tolls which it has devised. This wrong is being done with full knowledge and with the utmost deliberation, but it is only right to say that no condemnation from this side of the Atlantic can be more severe or more dignified than that which many persons in the United States themselves have pronounced against the Bill. The gravity of the matter will be appreciated when we realize that the passage of the Bill in its present form would enormously stimulate the building of steamships in United States yards. It would also offer a premium on the purchase by Americans of ships at present sailing under other flags, for the still existing restriction of American registry to ships built in American yards would be removed. The relief granted by Congress from canal dues to United States ships would act as a bonus which would make it easy for them to undercut our vessels in freights, and in course of time—and that, no doubt, no very long period—the whole of the nitrate trade from the West Coast of South America to Europe—now one of our most valued preserves, would be lost to us. Similarly we should have our trade from the western slopes of North America, whence at present British ships carry such vast quantities of grain to the United Kingdom and to Continental ports, most seriously cut into. The case-oil trade from the Eastern States to trans-Pacific ports would also be acquired by American vessels. This in relation to existing traffic. There are threats that a new and disturbing element would be introduced into our coal trade by the fact that the opening of the canal will render commercially accessible the large coalfields which are said to exist on the west coast of South America, and whose produce is said to be equal to that of our best Welsh collieries. Altogether it may be said that the need to insist upon and enforce our treaty obligations in this matter is most urgent.

A Barber's Earnings.

An interesting side-light on the way in which what may be called the parasitic trades at sea are more profitable than the regular callings, was shown in the case of Klein *v.* the Oceanic Steam Navigation Company, Ltd., tried before the Southampton County Court. It was a claim on behalf of the dependents of the second-class barber on board the ill-fated *Titanic*, and was brought under the Workmen's Compensation Act. A sort of preliminary objection to the plaintiff's case was raised to the effect that the dead man was not a workman within the meaning of the Act. But as the Company paid £150 into Court, even they cannot have attached much value to the point they set up. It seems to have been founded on the fact that the barber only received nominal wages of one shilling a month from the Company. But the fact that he did receive wages and was put on the articles was sufficient to knock the bottom out of that. Then came evidence as to what the man's earnings in his position were—beyond, of ccurse, the shilling a month. The second-class barber of the *Olympic* gave his earnings as:—From shaving, £8 8s.; from haircutting, £2 6s.; from shampooing, £2 10s.; tips, 30s. to 40s.; and from trading in souvenirs and toilet requisites about £9 10s. In addition to that he got free board and lodging, and the use of the shop without payment. The total amounted to about £26 a trip. How do these figures compare with what is paid to those upon whom are thrown the difficult and responsible tasks of maintaining discipline in the stokeholds and of seeing to the care and absolute efficiency of the valuable machinery with which such ships are crowded?

The Oil-Engined Ship

is making progress in every direction. Messrs. Furness, Withy & Company have their experimental ship, the *Eavestone*, already at work; the Hamburg-American Line have their purchase, the *Christian X.*, already employed, and their specially constructed *Monte Penedo* in the water. The Hansa Line, of Bremen, also has a motor-ship, the *Rolandseck*, launched, and the British Navy is turning its attention thoroughly to the subject. The demand for motor engineers is likely to be keen.

Boats for All and Boat Drills at Sea

are very necessary things, but shipowners and shipmasters

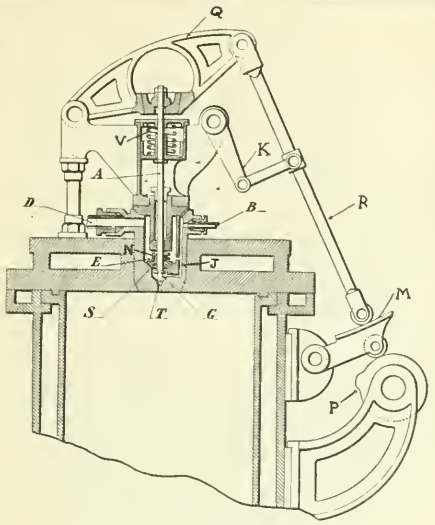


Fig. 4.
Section of a Fuel Valve (Sabathé Engine).

must remember that if boats are to be used, they and their gear, must be kept in a first-class state of efficiency. A very sad accident has occurred on board the crack Union Castle mail steamship *Kenilworth Castle*. One day out from Capetown on her homeward voyage, an order was given, when the ship was running at some seventeen knots, to lower a boat under the charge of the third officer. The order was obeyed and her crew of five men seem to have got into the boat all right. The officer was just stepping across to take command when one end of the boat became free and fell down towards the water, of course throwing the men out. The third officer, unfortunately, fell between the boat and the ship, and was killed by being thrown against the steel skin of the vessel. The other end of the suspended boat then gave way, and it fell upon one of the men in the water, injuring him somewhat. The ship was, of course, stopped, and the boat's crew and the body of the officer were recovered. How the accident happened has not been made public. It probably came from a latent defect for which no one could be responsible, but the necessity for keeping everything at all times ready and in good working order has once more been made apparent. It is fortunate, perhaps, that the failure, if it had to come at all, came at drill, for had it occurred during what Mr. Kipling calls the "real thing," it might—by the light of recent happenings—have involved the loss of a good many more lives than one.

The Recent Appreciation

in the value of steamships is shown by the experience of the *Edith*. She was a vessel built for the London and North-Western Railway as long ago as the year 1870 at Newcastle, by Messrs. A. Leslie & Co. She was fitted with twin-screw

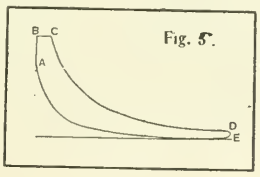


Fig. 5.

Fig. 5.
Indicator Card of Sabathé Engine.

engines, and in March, 1912, being no longer equal to their requirements, was cast from the fleet. Her purchasers, who gave £2,120 for her, were a firm of shipbreakers; but somehow they found her fit for something better than the scrap heap. She was purchased at a nice little profit by a Belgian firm, who paid £3,500 for her in the month of June. Her new owners gave her the name of *Vos*, but did not keep her long, for she has just been transferred to the Italian register; the consideration at which she has now passed was no less than £4,550. Thus in less than five months she has appreciated upwards of 100 per cent.! Many ships have, of course, changed hands at enhanced prices of late, but such a remarkable instance as this is worthy of special notice.

The Manchester Ship Canal

has issued its fifty-fourth half-yearly report, and on the 8th August held its meeting. Like all other British transport organizations, it has a tale of lost profits due to the continued labour troubles. Yet in spite of that there are several features which show that those who built the canal, in spite of all opposition, were wiser than those who opposed them, for gradually Manchester is becoming one of the most important markets in the country for timber and grain—commodities for which there is naturally a great demand in the district which it serves—and this fact gives fair ground for the belief that in other commodities it will be found that, as time goes on, other import business will be acquired and extended. Then on the Trafford Park Estate and elsewhere, large works, which will bring traffic to the canal, continue to be founded. Within the last few weeks a large seed-crushing mill, capable at the outset of dealing with some 30,000 tons of seed per annum, has been opened, and there are corn mills under construction which will need, to keep them going at their full capacity, an import of some 200,000 tons per annum. Then there are to be cement works at Ellesmere port and steel works at Partington—all of which undertakings ought to bring the ships and commerce to the canal. This increase in traffic necessitates, of course, increased provision at the Docks, and another 55,000 square yards of flooring under cover are to be added to the transit sheds at No. 8 and No. 9 docks, whilst at the latter the second big elevator—whose foundations were laid at the time of the construction of the dock—is to be completed. The result of all this—as far as a direct monetary return to those interested in the adventure is concerned—may be summed up by saying that the earnings which—after paying expenses—were *nil* in 1896 have risen to £275,000 in 1911. This has enabled the directors to pay the whole of the current interest on loans, including those from the Corporation. They now look forward to the time when they may be able to afford a dividend on the Corporation stock, even if it be too soon to think of the day when the shareholders may hope for a dividend. But the steady developments which are taking place, the confidence which the trading community are showing in the usefulness and management of the concern, all show that it will continue to improve its position. No doubt the city of Manchester and its inhabitants have already indirectly benefited to a great amount by the stimulus which it has given to their trade and to the general employment of the inhabitants. But these facts will hardly make up to the shareholders, as such, for the long delay in getting to the dividend-paying stage.

Ice in the Atlantic.

The season of 1912 has been indeed extraordinary in this regard. In spite of the exceptional care which has been taken by all navigators since the *Titanic* disaster, we have had two collisions with it since that catastrophe. Fortunately, neither of them has been very serious. First of all it was the *Manchester Inventor*, one of the Manchester Liners, which struck ice off the Straits of Belle Isle at the end of July, when homeward bound from Montreal. Her master thought it desirable to put into St. John's. Early in the following month the Allan Liner *Corsican*, also eastward bound, was in contact with ice off the Canadian coast. But though she at once reported the accident by her wireless installation, the damage was so unimportant—affecting as it did only the stem and adjoining plating above the waterline—that it was not necessary for her to interfere with her voyage, and she proceeded, though at low speed, for Liverpool,

her port of destination. It is said that the reason that she escaped so easily was that at the time of the collision, which took place in thick weather, she was proceeding at reduced speed.

BOATS AND DAVITS COMMITTEE.

Departmental Committee on the Stowage, Launching and Propulsion of Ships' Boats.

THE President of the Board of Trade has appointed a Committee to advise him, in the interests of safety of life at sea with regard to methods of stowing, launching, and propelling ships' boats, and other kindred matters. The reference to the Committee is to advise: (1) As to what are the most efficient arrangements for stowing boats on steamships of all classes, for launching them in an emergency and for embarking the passengers and crew; (2) As to whether and if so to what extent, mechanical propulsion can with advantage be adopted either in addition to, or in substitution for propulsion by oars and sails; (3) As to the question of rafts, and, in particular whether, if of approved character they should be allowed in substitution for boats; and if so, to what extent and under what conditions; (4) Whether, independently of the foregoing, the Committee desire to make any recommendations with reference to the above-mentioned matters which would in their opinion contribute to the safety of life at sea. The Committee is constituted as follows: Professor J. H. Biles, LL.D. D.Sc., Professor of Naval Architecture in the University of Glasgow (chairman); Rear-Admiral the Hon. S. A. Gough-Calthorpe, C.V.O., R.N.; A. E. Doxford, Esq., of Messrs. W. Doxford & Sons, Ltd., Sunderland, engineer; Captain J. G. H. Flint, Elder Brother of Trinity House; Michael Joyce, Esq., M.P., James Maxton, Esq., of Belfast, naval architect; F. J. Stephen, Esq., of Messrs. A. Stephen and Sons, Ltd., Govan, shipbuilder; H. B. Wortley, Esq., of Messrs. Alfred Holt & Co., Liverpool, naval architect. The secretary to the Committee is Mr. F. P. Robinson, of the Board of Trade, 7, Whitehall Gardens, London, S.W., to whom any communications relating to the work of the Committee may be addressed. The Committee will be glad if inventors and others who desire to submit inventions or schemes for consideration will do so by the 1st October, 1912. The Committee cannot accept any responsibility as to the protection of the rights of inventors. A full description of the device (without model) should be sent, in the first instance, to the secretary, Mr. F. P. Robinson.

THE MOTOR-SHIP "MONTE PENEDO."—The motor-ship *Monte Penedo*, of 6,500 tons, one of two vessels ordered by the Hamburg-South American Steamship Company from the Howaldt yards at Kiel, ran a trial trip from Hamburg to Gluckstadt and back on August 24th. The company on board included representatives of the British, Japanese, Italian and Argentine navies, of Messrs. Harland & Wolff, Ltd., and of a number of other well-known shipbuilding and engineering firms. The ship made 13·8 knots, as compared with a contract speed of 10·5 knots, and proved herself a handy ship. The general manager of the Hamburg-South American Line says that the vessel fulfils every expectation and requirement. The engines of the *Monte Penedo* have been made by Messrs. Sulzer Bros., of Winterthur, Switzerland. They are of the Sulzer-Diesel type, of 1,700 H.P.

MESSRS. W. H. BAILEY & CO., LTD., of Salford, Manchester, have sent us a catalogue of Bailey's "Davidson" patent steam pumps, for which they claim many advantages over other pumps. This pump, which was first introduced thirty years ago, has been much improved and simplified and its range of usefulness increased. It is fully described and illustrated in the catalogue.

MESSRS. COCHRAN & CO., ANNAN, LTD., have supplied to the Nigerian floating dock, now being built, a Cochran (Annan) donkey boiler with patent seamless furnace, to drive the electric light engine.

WAYGOOD LIFTS WORKS.

THERE has recently been completed, and formally opened by the Mayor of Southwark, an important extension to the premises of Messrs. R. Waygood & Co., Ltd., Falmouth Road, London, S.E., the well-known manufacturers of electric lifts, cranes, etc. Under the guidance of Mr. Henry C. Walker, one of the oldest members of the firm, and others, a large company of visitors on the occasion of the formal opening were shown round the works, the new shops being declared open by the Mayor of Southwark, who at the same moment pressed an electric button which put in motion the lengths of line shafting. The whole of the shafting is electrically driven, and electric cranes as well as electric lifts are features of the shop equipment. The extension consists mainly of a new building, 250 feet long, and has a cubic capacity of about 750,000 cubic feet. The clear superficial area of the ground floor in conjunction with the one to which it is attached is 15,500 square feet, and on the first and second galleries which are provided round the building there is a superficial area of 11,000 feet respectively. From the basement to the roof the height is 54 feet. The building is fire-resisting throughout and there is an ample supply of hydrants. Heating and ventilation are carried out on the latest principles.

CATALOGUES RECEIVED.

Messrs. Simpson, Strickland & Co., Ltd.—We have received a new catalogue from Messrs. Simpson, Strickland & Co., Ltd., of Dartmouth, which represents some of the different types of machinery, yachts, launches and other vessels built by them. The catalogue is profusely illustrated by views of the different machinery dealt with in the descriptive matter. The contents comprise high-pressure non-condensing engines, compound condensing, triple-expansion of the three or four-crank type, quadruple-expansion of the four-crank and Kingdon type, liquid fuel boilers and burners, various types of boilers for solid fuel, jaws, circulating pumps, dynamos, propellers, petrol and crude oil motors and, lastly, designs of hulls. This does not by any means exhaust the capabilities of the firm, but those particular features are put forward to indicate some of their main products.

The Vauxhall and West Hydraulic Engineering Co., Ltd.—The marine section of this firm's catalogue for 1912 has just reached us, and its contents are well worthy of the careful consideration of those purchasing machinery. The catalogue is divided into ten sections for convenience, which comprise a series of views of the estate and works, descriptions and illustrations of triple-expansion engines, compound screw engines, single and double cylinders, high-pressure non-condensing engines, paddle engines for both stern and side wheels, various types of pumps, boilers, condensers and propellers. The illustrations are not only numerous, but are quite works of art in certain cases, and fully carry out the purpose of indicating to the readers the sort of machine described in the letterpress. The catalogue is got up in the best style and is quite in keeping with the well-known reputation for all machinery manufactured by them.

MESSRS. W. H. WILLCOX & CO., LTD., have found it necessary, through expansion of business, to acquire increased accommodation, and they have taken a building adjoining their main warehouses, 32, 34 and 36, Southwark Street, *viz.*, No. 38, which they removed to on August 27th. The registered offices will in future be at No. 38, Southwark Street.

The Late William Birkett.

The Late D. D. Boyd.

OBITUARY.

William Birkett.

It is with great regret that the death of Mr. Wm. Birkett, superintendent engineer of the P. & O. Company at Bombay, in St. George's Hospital, Bombay, on June 6th, which had hitherto escaped notice, is now recorded, with our sympathy towards his widow, who is now in London. Born in 1851, he served his apprenticeship in Greenock with Messrs. John Hastie & Co., attending meantime evening classes to improve himself in those studies which were found necessary to an understanding of engineering science. He joined the P. & O. Co. about the year 1871, and served through the various grades to chief engineer. He so acquitted himself in this position that when a vacancy occurred at Bombay in 1903, he was appointed superintendent engineer. He was within a short time of retirement from India and active service when he was seized with the illness to which he succumbed. Mr. Birkett was a member of the Institute of Marine Engineers of about twenty-three years standing, and was elected the representative Vice-President at Bombay, an office which he held at the date of his death.

D. D. Boyd.

To many of our readers in India, as well as to a large number who have retired from trading in Eastern waters and are now located nearer home, the death of Mr. D. D. Boyd, at the age of 65, has been an event of very great regret, and deep sympathy is extended to Mrs. Boyd in the loss she has sustained by the sudden call which summoned her husband from her side. Mr. Boyd, born at Dumbarton and educated at the Academy, served his apprenticeship with Messrs. Denny & Co., and in 1873 he went to sea as a junior engineer in the *Almora*, spending most of his time in the Indian coast service of the British India Steam Navigation Company. He became chief engineer and held that position for a period of thirty-one years. He was retired from the sea service some years ago with a pension, but has been engaged as an inspector for the Company on new steamers building on the Clyde and was resident in Glasgow. On August 6th, while occupied at Messrs. Barclay & Curle's works, a faintness overcame him and in a short time he expired. The funeral was largely attended by old friends and colleagues, several of whom journeyed long distances to Glasgow and Dumbarton to pay the last tribute to the memory of one who was highly esteemed and respected for his sterling worth and goodness as a man, as well as for his attainments and ability as a marine engineer. He was elected a member of the Institute of Marine Engineers in 1890.

John Morley, R.N.R.

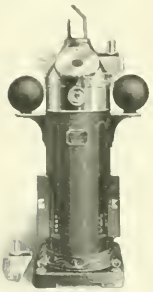
We regret to record the death of John Morley, R.N.R., chief engineer of the Wilson Liner *Sappho*, which took place on the 16th August. Mr. Morley had been in the service of the Wilson Line about thirty years and died after returning from a voyage. He was a retired engineer-commander of the R.N.R., a member of the Falmouth Lodge of Freemasons, and was also a member of the Marine Engineers' Association. At the funeral, which took place in the Hull Western Cemetery, there was a large gathering of mourners, which included the ship's company. Mr. Morrison, assistant superintendent, and Mr. Embly (retired), assistant superintendent of the Wilson Line, represented the Wilson Line Company, and Bro. G. Grace, chief engineer s.s. *Tinto*, the Marine Engineers' Association, with Mr. Shepherd, secretary of the Association.

Messrs. Matthew Keenan & Co., Ltd., of London and Glasgow, the well-known boiler and steam-pipe coverers, will be exhibiting at the International Engineering and Machinery Exhibition to be held at Olympia from 4th to 26th October, where they will have a comprehensive display of non-conducting materials in every form. Engineers and all those interested in steam plant will be well advised to visit this stand, where every opportunity will be afforded by the management to thoroughly go into the matter of using the most suitable form of covering for different circumstances and to discuss all questions relating to non-conducting coverings.

HEZZANITH STANDARD BINNACLES.

IN these days of rapid scientific progress it may be truly said that "It's the way it was always done" is a phrase which should have no weight, and particularly so is this the case in connection with nautical instruments. Hoary tradition and custom no doubt demand veneration and respect, but in its bearing on the future, past tradition cannot compete with present progress, and therefore new ideas and modern methods and even startling departures have to be continually under careful observation; and when it is decided that the new is better, there must be no sentimental hesitation in scrapping the old. It is on these lines that the well-known firm of Messrs. Heath & Co., Ltd., work.

The handsome binnacles of the "Hezzanith" type, which we illustrate in the adjoining diagrams, while retaining all the good and well-proved features of these widely-used binnacles, embody many useful improvements, while the stands made of the best



PATENT "HEZZANITH."

MARK I.

STANDARD BINNACLE.
(Oil Lamps.)

Fig. 1.

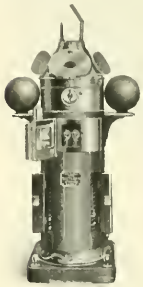
specially selected hard teak-wood, are well calculated to resist the ravages of weather and temperature. The brass work is all tested for absence of magnetic material and the corrector spheres and flinders bar are tested carefully after being demagnetized.

Special attention is given to the suspension of the compass in these binnacles; exhaustive experiments, extending over many years, have culminated in the present arrangement of spring suspension, which is calculated to meet the various vibratory conditions of different ships. The main suspension consists of two beam helical springs (one right-handed and one left-handed) from the ends of which is suspended a saddle-piece and hanger which connects with the journal on the compass gimbal. Above these two springs is fitted a laminated bowed-blade damper spring, the function of which is to damp the superfluous vibrations of the helical springs. The pressure exerted by this "damper" on the helical springs is adjustable, and can be varied from nothing at all to producing a condition approximating rigidity. This damping arrangement, which is protected by patents, is a most practical improvement, and a great factor in producing that stability in the compass card which is so essential.

The whole of this suspension is adjustable in azimuth for about six degrees, thus enabling the lubber line of the compass to be set absolutely on the keel-line of the ship.

Another interesting and very practical departure from "the way it was always done" is the method of attaching the binnacle top to the rim. The old way was to fit lugs on the rim and then cut corresponding gaps in the beading of the top. This had two main defects: Firstly, the cutting away of the beading weakened the top, and secondly, there was always a lot of "fiddling about" with the top until the gaps were in the correct position to pass over the lugs.

In the "Hezzanith" Binnacles the top is provided with *automatic* catches, and can be placed securely on the rim in any position. There are no lugs on the rim, and no gaps in the beading of the top, and the rim itself consists of a strong grooved *casting* instead of the usual beaded and wired sheet brass construction. To remove the top all that is required is to apply the pressure of the thumbs on two plungers suitably placed close to the handles with which the top is provided.



PATENT "HEZZANITH."

MARK II.

STANDARD BINNACLE.
(Oil and Electric Lamps.)

Fig. 2.

As is well-known, the Mark I. Binnacle, illustrated in fig. 1, is provided with oil lamps above the compass; these are removable, and the glazed openings over which they are attached to the top are provided with brass shutters; the lamps can be attached without the shutters being removed, and thus there is no fear of loss of parts.

In the Mark II. Binnacle illustrated in fig. 2, the lighting is effected by oil and electric lamps placed below the compass, the compass bowl being transparent to enable the card to be properly illuminated.

In these binnacles the oil lamp, which is a new model with two powerful burners, and is attached to the binnacle by a very simple and neat device, can either be left on the binnacle when using the electric light, or if desired can be removed, in which case a brass panel slides over the lamp opening. The electric light is provided with a special current-reducing switch, very useful in taking azimuth observations.

The compasses in both models are provided with suitable viscous fluid chambers which effectively damp all excessive oscillations, while the light cards are of specially registered design, adapted to give excellent results.

If desired, liquid compasses can be fitted to these binnacles, in which case the cards are of small diameter compared with the bowl and have short needles for the purpose of correct compensation.

A large magnifier is attached to the compass, which doubles the apparent size of the card. The azimuth instruments and sighting devices are all of improved form, ensuring great accuracy.

A modification of the Mark II. Binnacle is the Mark II. "Torpedo" Binnacle, with 8-inch liquid compass, which is extra strong, and has special arrangements for reducing the light as desired and shutting off all stray beams. A spotting lamp fitted to the top focusses a single beam of light on the lubbers line; it can thus be illuminated both above and below with both oil and electric lamps.

We understand that throughout manufacture these binnacles are subjected to the most careful examination and that the result is an instrument calculated to bring a thrill of satisfaction to any officer of any ship having such an up-to-date equipment.

CORRESPONDENCE.

We do not hold ourselves responsible for the opinions expressed by our correspondents.

To the Editor of THE MARINE ENGINEER & NAVAL ARCHITECT.

Sir,—In the issues of the "Times," "Daily Mail" and other papers of the 8th July last there appeared a cable despatch dated New York, July 7th, describing a mishap to the R.M.S. *Olympic*, White Star Line, in which it was stated that the "Bye-Pass of the Telemotor became deranged, thus interfering with the steering gear."

After correspondence, we are now in a position to state, under official sanction, that the Telemotor was not at fault, and that the press reports in that respect were without foundation. The steering gear was not of our design or manufacture, but the Telemotor installation was made and supplied by us.

We have not sent any communication to the daily press on this matter, and we trust that you will allow us the privilege of your columns to make this statement, so as to reach our clients, and prospective clients, whom we wish to know that this allegation against the Telemotor was false.—Yours faithfully,

BROWN BROS. & CO., LTD.,
W. G. GIBBONS, *Director.*

Rosebank Ironworks,
Edinburgh, August 9th, 1912.

To the Editor of THE MARINE ENGINEER & NAVAL ARCHITECT.

Sir,—The article and illustrations on "The *Comet* and her Creators" in your August issue are very good. It is a pity, however, that the doubtful tone of your remarks may tend to prolong the myth of another engine than Robertson's. Those who, like Dr. Caird, advocate a claim for Greenock should be asked to state clearly their evidence of fact, not repetition of impalpable assertion. I think that only Mr. Blackwood's lines should be described as the "original design." Wood's later sketch, long after the *Comet* had ceased to exist, was, of course, from Wood's hand, but no more than a copy or historical drawing, not a design. An old engineer, still alive, informs me that when the engine was being overhauled prior to leaving Glasgow, Robertson commented on the flywheel as an addition for which he was not responsible, and which he thought unnecessary. I know about the claim put forward for Dr. Paterson as having been associated with Mr. Robert Napier in connection with the monument over Henry Bell's grave at Row. There was some correspondence between them, but no evidence whatever exists, I am quite sure, that Dr. Paterson paid a penny of the cost. After all, the latter point is of very secondary importance. It is to be hoped that your unbiassed, although, according to my view, somewhat unfortunate references to rival claims in the matter of the makers of the *Comet's* engines, may adduce fresh, and possibly convincing, evidence as to the rights of the subject.—Yours truly,

DAVID BELL.

Glasgow, August 9th, 1912.

REVIEWS.

Calculations for Marine Engineers. Part I. of Griffin's New Guide to the Board of Trade Examinations for Marine Engineers. By R. A. McMillan, B.Sc., Wh.Ex. London: Charles Griffin & Co., Ltd. Price 8/6 nett.

This is an entirely new work which, as the title implies, is for use as a guide to students working up for the Board of Trade examinations for marine engineers. The book is divided into six sections, the first of which deals with tables, arithmetical and algebraical processes, and formulæ with exercises on same and answers. Section 2 deals with mensuration; section 3 with temperature, heat, mean pressure and horse-power; section 4 with the statics involved in dealing with various parts of machinery and of ships, the problems of cut-off and the slide valve generally, and matters relating to paddle wheels and propellers; section 5 deals with the dynamics of various devices, such as pumps, and section 6 has reference to miscellaneous examples. The method of treatment of the subject is not only interesting and to some extent novel, but is at the same time of great educational advantage to the student, who is led on by easy stages to absorb the features of each problem in a thorough and comprehensive manner, so that he understands exactly why he arrives at his result, hence it is not a question of remembering formulæ but of applying principles which, when understood, are very simple, easy of application and unlikely to be forgotten. It is quite easy to recognise in the author of this work one who has a great gift for imparting knowledge to others in a simple and convincing manner, and it is this feature which makes the work such a valuable asset to any student who is preparing as a candidate for the Board of Trade examinations. The exercises are equally useful to those who are studying in other directions in the same subject, and the work has therefore a value much greater than for the limited class who enter for the Board of Trade examinations.

My Life at Sea. By Commander W. C. Crutchley, R.N.R. London: Messrs. Chapman & Hall. Price 7/6.

The volume before us has a preface of fifty-seven lines by Earl Brassey, G.C.B., wherein the founder of "Brassey's Naval Annual" gives a brief summary of the author's history. The book itself tells how the boy, who in 1863 went to sea as an apprentice aboard the sailing barque *Alwynton*, of 491 tons register, rose to be a master of a 4,500-ton passenger steamer. Though the sea career of the author closed as recently as the early nineties, it seems extraordinary to note how much the world of steam navigation has progressed in the score of years that have intervened. The earlier years, when the boy visited Australia and New Zealand in the days of the gold rush, show a good deal of the hardships of the sea life, hardships which either make a man of the youngster or convince him that he had better, if he can, chose another vocation. What a difference between the nautical want of education in those days and that scientifically apportioned curriculum so carefully and fully administered to the present-day officers by the training vessels *Worcester* and *Conway*. After a few years of sail, Mr. Crutchley went into steam and became third officer on the old Union Liner *Roman*. His new ship was a screw steamer, built at Deptford by Charles Lungley & Co. in the year 1863. She was of 1,448 tons gross and 1,108 nett register, her length being 267 ft., with a beam of 32 ft. 4 in. and a depth of hold of 15 ft. 9 in. She had two horizontal engines of 48 in. diameter and 33 in. stroke, built by Messrs. C. A. Day & Co., of Southampton. We have been at some pains to obtain the particulars of this vessel, because she was so entirely removed from anything employed of recent years in the ocean mail service. Two years after the author joined her, that is to say in 1872, she was lengthened to 320 feet and given new compound engines by Messrs. Maudsley's. She was now of 1,851 tons. A vessel of her original size, or even one considerably larger, adequately sparred, would, of course, be capable of using her sails on occasion to some purpose, and thus the newcomer did not find himself quite so strange as one in his position might do to-day. Throughout his career, indeed, Captain Crutchley seems to have taken an immense interest in the sailing of his vessels, and to have lost no opportunity of adding to his speed and of saving coal by the use of his ship's sail power. What that judicious

[illegible] sail power meant may be gauged by the statement that to the ordinary speed of the *Danube*, a mail steamer of 1850 re-engined in 1873, her canvas would add at least two knots. In the Union Line he worked at times on the mail route, and for other periods on the coastal service between Capetown, Natal and the northern ports. His most exciting experience seems to have been when chief officer of the *Syria*, that vessel broke her shaft off Ascension, made that island under sail, and was towed thence to England by the Company's s.s. *Imperium*, a voyage whose monotony was varied by a collision off Portland with the sailing vessel *Amacia*, an adventure which cost the Company dear, for the ship and her valuable cargo went to the bottom of the Channel. A marked set back in the expansion of the Cape trade, synchronizing with the change from sail to steam of the New Zealand Shipping Company, Captain Crutchley, now himself a master and lately in command of the mail steamer *Mexico*, was transferred to the long route, and commenced with the new Fairfield-built liner *Ruapehu*, of about 4,000 tons. The remainder of his active service was in charge of this vessel and her sisters, working down to the Cape, across the Indian Ocean to Hobart and New Zealand, and home by the Horn. Being amongst the first to engage regularly in this trade, he was confronted with certain problems as to the wisest course to adopt in order that the low powered vessels of the day might encounter the most favourable winds, whilst at the same time, in the more southern latitudes, avoiding ice as much as possible. Even to the end it might be said of him that he literally sailed his ships, for canvas was in evidence whenever it was possible to use it. Much of the book is taken up with anecdotes of various persons who travelled by his steamers, but the point of the book is that it gives the experience of a master mariner in steam in the now almost forgotten period when sails had not yet fallen into oblivion.

Pattern Making. Fourth Edition. By J. G. Horner. London: Messrs. Crosby, Lockwood & Son, 1912. Price 7/6.

This work commends itself in many ways. It is essentially practical, and the author has evidently been through every branch of the trade. He is able not only to describe the various processes used in the pattern shop, but to present them, by the aid of sketches interspersed in the pages, so that the reading matter may be readily followed at close hand, which is a great advantage. That a fourth edition has been reached we are not greatly surprised considering the practical information conveyed. The trade is one of great interest and the fundamental part of mechanical engineering. The drawing leaves the draughtsman, and the pattern-maker has to interpret it and prepare the model for the foundry. He must be a good wood-worker, able to read a drawing, and therefore be a good engineer. The qualifications are exacting, and therefore such a book as this needs no apology if well written. This comes up to the standard, and should prove most useful to workmen desiring to make themselves proficient in every branch of the trade. We see how to manipulate the wood, make cores, mould in sand, and the many details that a good craftsman must be familiar with. Special examples are taken, such as machine tools, engines, screw propellers, to teach the student how to set about making the pattern. The tools and machines used in the shop are described also. We should have liked to have seen better descriptions of moulding machines. We merely find here specimens of the work done upon them, and the fact that these essays, if we may so call them, were originally published in a journal, makes the whole appear a little disjointed. Still there is a fund of information displayed throughout these pages, and though no book-knowledge can take the place of actual experience in the shops, still what we find here will go a long way towards filling up the gap which lack of such experience would occasion.

A.B.C. of Hydrodynamics. By Lt.-Col. R. de Villamil. London: Messrs. E. & F. N. Spon, 1912. Price 6/-.

This volume will be likely to be of some interest to naval architects and engineers concerned in the design of vessels, for it epitomises generally what has been already written on experiments bearing on hydrodynamic theories. As the author truly states, the subject is one that is more or less involved. Some of the highest intellects have been engaged in it and yet left the matter still obscure. This is an endeavour to clear away some of the darkness in a popular and simple manner. Ideas that are current respecting stream line friction on ships are shown in some cases to be incorrect, and capable of explanation in other than current ways. To our surprise we note here that the bow of a vessel can be rounding without any detriment to speed. Experiments are said to prove the truth of the statement. Anyhow, what is a noticeable feature in the book is the variety of examples in a simple fashion of the action of water and air on bodies in motion, and the illustrations are clear in describing the same. Those concerned will therefore probably meet with something new, and find possibly their previously-formed opinions a little upset. The author does not claim to put forward anything that is really novel, and gives authority for all he says, so that anyone can follow him readily and study the origin of the information conveyed. Resistance has a chapter devoted to it, and the effect noticed of bodies in motion in a "perfect" liquid. This is, of course, as a preliminary to actual conditions. In a "perfect" fluid a body is said to move without any resistance whatever. This shows, therefore, the difficulty of coming to definite conclusions, because so much has to be taken for granted. However, we find here a chatty and agreeable dissertation on what is admittedly a most difficult problem. Naval architects themselves are held to have one set of reasoning for the action of water on the bow and another for that at the stern, and if this is so, who shall venture to form a right judgment upon the matter? There is, however, a great deal of interest in these pages, which should not be missed by those concerned.

Concrete Costs. By F. W. Taylor and S. E. Thompson. London: Chapman & Hall, Ltd.

This is a book written for use by architects, engineers and contractors to enable accurate estimates of the cost of concrete works and structures to be readily made and to render some practical assistance in the laying out of work, so that the materials used will be economically handled and the product of each workman may be improved. Efforts in this direction will have the effect of the introduction of the principles of scientific management in the building trades, with the result of a higher commercial efficiency being reached than has obtained in the past. The general principle adopted is the treatment of the subject by using unit factors both as to time and cost of material. The success of the system must depend upon the possibility of obtaining a fairly uniform result from the human factor which in the past has been so difficult owing to trade union restrictive influence and other considerations which are prevalent in the mind of the average worker. This aspect of the subject has been dealt with in a most interesting manner and very useful suggestions are made to combat one of the greatest obstructions in economic production. The work is well worthy of the most careful study of all those who are interested in concrete construction, and the careful perusal of it will well repay the effort involved to obtain useful knowledge in the directions indicated.

Boiler Explosions, Collapses and Mishaps. By E. J. Rimmer, B.Sc., Assoc. M.I.C.E., Barrister-at-law. London: Constable & Co., Ltd. Price 4/6 nett.

This work is a summary of the causes of boiler explosions and the recommendations for their prevention, contained in the reports of the Board of Trade from the year 1882 to the year 1911, and includes a statement of the statutory duties of steam users and their liabilities as defined by the commissioners holding investigations under the Boiler Explosions Acts. The information in the work, which is both of a legal and scientific character, is given in a manner which can be easily assimilated by a reader of ordinary intelligence. The combined qualities of the lawyer and engineer, as exemplified in the person of the author, has enabled him to deal with the subject concisely, and thus much time is saved the reader who, for example, is an engineer, in understanding and applying legal decisions to any case in point. Every boiler owner ought to make himself acquainted with the responsibilities of his position and he can readily do so by an intelligent study of this work.

FRAHM ANTI-ROLLING TANKS.—In the article on the Frahm anti-rolling tank, published in our August issue, a discrepancy occurred. The weight of effective water used in the installation for the German East African liner *General* was given as .122 of the coal displacement. This should have read 1.22.

LENGTHENING SHIPS.

MESSRS. A. Stephen & Sons, shipbuilders, Linthouse, and ship-repairers, of Govan Graving Dock Repair Works, have been at work since the 3rd of July (the Fair holidays, however, intervening) adding about 50 ft. amidships to the s.s. *Marathon*, of the Aberdeen Line. The work is being carried out in No. 2 graving dock, which, by an arrangement with the Clyde Trustees, the firm will have the continuous use of until the end of October, in order to carry out the lengthening not only of the *Marathon*, but the sister ship *Miltiades* as well. By the lengthening of the steamers from 455 ft. between perpendiculars (475 ft. overall) to 505 ft., the draught will be reduced by about 4 inches, and the added portion will represent an addition of about 1,000 tons to the gross measurement and about 1,220 tons deadweight carrying capability. The added space is being utilized as an additional hold, and new accommodation will be provided on main and promenade decks for about 40 passengers. The lengthened vessel will have two funnels instead of one, the new funnel being required to maintain the symmetrical appearance of the vessel more than for any need of it for boilers or machinery. To make the alterations on the *Marathon*, the hull was cut a little forward of the forward boiler-room bulkhead, and the fore part bodily drawn away a distance of 49 ft. 10 in. For this purpose ways and a launching cradle were laid and erected under the portion to be moved, just as in the case of a launch from the building stocks, and this difficult part of the work was expeditiously and most satisfactorily accomplished on July 25th, hauling being done by two powerful hydraulic capstans at the dock entrance through treble purchase wire-rope tackle, aided at first by half a dozen 5-ton hydraulic jacks disposed at end of sliding ways and around the girth of the ship, so as not to unduly strain the structure at any one part. The gap in the hull is now fully framed and partially plated, and the work of filling in is expected to be completed early in September, when the *Miltiades* is to arrive in the Clyde for similar treatment. The unusual nature of the work has attracted considerable attention at the docks, and the skilful way in which it has been carried out reflects much credit on Mr. T. Ballantine, the repairing manager to Messrs. Stephen & Sons, and on his able staff of foremen.

Industrial and Trade Notes.

THE CLYDE AND SCOTLAND.

(*From our Own Correspondent.*)

Launching Activity.—Although at the moment of writing there is still a goodly proportion of the month of August to run, and the total figures are not yet available, there is enough to show that the output of shipbuilding on the Clyde will be very large—if, indeed, a record for the period is not created. Quite a number of new vessels of large tonnage and high-class character have been—or will be—sent off the stocks. On the 13th, Messrs. William Beardmore and Co., Dalmuir, launched the *Willochra*, the third and last of the three twin-screw steamers built to the order of the Adelaide Steamship Co., of South Australia. These vessels are 410 ft. in length between perpendiculars, 56 ft. 6 in. beam, 37 ft in depth to upper deck, and are about 8,000 tons gross measurement. On the 17th, Messrs. John Brown and Co., Clydebank, sent off the stocks, in the presence of the Prime Minister of Canada and other distinguished people, the twin-screw *Niagara*, of 543 ft. length and 13,000 tons measurement, which they have built for the Union Steamship Co., of New Zealand, afterwards more particularly referred to. On 28th August, the Fairfield Shipbuilding and Engineering Co., Govan, are to launch the Canadian Pacific Railway Company's quadruple-screw turbine steamer *Empress of Russia*, an improvement on the two previous "Empress" steamers built at Fairfield, which have been so popular on the Atlantic. She will not only be the largest steamer serving in the Pacific, but she will have several novel features. She has a cruiser stern and she is so designed that she can be transformed, at very short notice, into an armoured cruiser.

The Fairfield Shipbuilding and Engineering Co. have been entrusted by the directors of the Union-Castle Mail Steamship Company with the order for another large mail and passenger steamship for the Company's East African service.

Messrs. Harland & Wolff, Ltd., will have launched by the time these notes appear (on the 29th August) from their Govan establishment—formerly the London and Glasgow Shipbuilding Co., Ltd.—their first warship, the second-class protected cruiser *Sydney*, building to the order of the Australian Commonwealth and will thus take rank as British naval shipbuilders. With the exception of warship propelling machinery (they engined the British battleship *Neptune*) and the yacht *Enchantress* for the Admiralty, the firm's activities at Belfast have hitherto been confined to merchant shipbuilding. The *Sydney*, of course, was one of the contracts taken over with the acquisition of the Govan works, three others being the British destroyers *Lynx*, *Midge* and *Owl*, now in course of construction. The launch is to be attended by some ceremony, as is but natural. It will mark the advent of the firm to the arena of warship construction, and it may be assumed that they will now figure regularly on the list of firms competing for Admiralty contracts. Their vast organization and extensive facilities at both Govan and Queen's Island, Belfast, should enable them to become keen competitors for naval work of practically every description. This is only to be expected when it is remembered that as regards the shipbuilding, engineering, and outfitting sections of the Govan works, they have been brought up to naval standard, and that there is a strong factor to conjure with in the close proximity to sources of supply of warship-building material, armament and outfit generally.

Messrs. John Brown & Co., Ltd., Clydebank, are to construct the turbine installation for one of the new battleships which are at present under construction in Russia. As is well known, the firm have an arrangement with the Russian Government under which they are superintending the construction of the hulls of several battleships in Russian yards. The Clydebank firm have also lately been entrusted with the order for the propelling machinery of the second Chilian "Dreadnought," which is about to be laid down by Messrs. Armstrong, Whitworth & Co., Elswick. As the vessels are sister ships, the turbines will be practically a repeat of those which are being made at Clydebank for the first vessel. The shaft horse-power is to be 37,000, and the vessels are to have a speed of 23 knots. The second vessel will be called *Almirante Cochrane*. These orders, together with the vast amount of other work on hand, will keep the engineering department at Clydebank fully employed for a considerable time to come. The New Zealand Union Company's steamer *Niagara*, launched on August 17th, is of over 13,000 tons gross, and embodies several interesting features in her construction. She will be fitted with a combination of reciprocating engines and turbines, and her furnaces will be adapted for the burning of oil fuel as well as coal. The vessel will inaugurate the new mail service which is to be established between Canada and Australia and New Zealand.

Messrs. Caird & Co., Greenock, have received from the P. & O. Company an order for a steamer of 11,500 tons measurement and 525 ft. in length, which will be an improvement on the *Moolton* built for the same Company in 1905.

Engineer Apprentices and the Insurance Act.—Whether as a protest against the National Insurance Act, or seizing hold of it as a means to obtain a rise in the standard rate of wages, the apprentices of many of the marine and locomotive works of Glasgow, Kilmarnock, Motherwell, Edinburgh, Aberdeen, etc., struck work early in August, and with increasingly strengthened support, both as regards numbers and advice, the strike has been maintained, and has spread itself up till the time of writing. It is openly enough maintained that, while the Insurance Act has brought matters to a crisis (the wages paid to apprentices being too low to allow of a deduction of 6½d. per week for insurance), the youths are "out for an advance of 1s. per week"! It is asserted that in the last thirty years the wages of journeymen had risen by 12s. or 14s., but the wages of apprentices had remained unchanged. Now the time has come for an increase to be demanded. The effect on trade is variously reported. One firm, at least, in the Employers' Federation, has duly notified their apprentices that if they do not return to work immediately they may consider themselves out of

employment. The settlement of the strike is [illegible] of employment temporarily some of the [illegible] engineering establishments. The labour [illegible] locomotive works, but in the marine section it is stated that the opposite is true. Some of the firms engaged have had vessels to fit out are anxious to [illegible] movement to overtake the work which would have been done by apprentices had these been available. The pressure taken up by the Civil Associations of Employers is that apprentices on strike may be re-instated by their old firms on the existing rate of wages, but that no Company will engage any apprentices other than their own or take on any new apprentices so long as the dispute exists.

Port Glasgow Shipyards and Electricity.—Negotiations which have been proceeding during the past three years between the Port Glasgow and Greenock authorities for the latter supplying shipbuilders with electricity for lighting and power purposes have for the second time fallen through, and there seems little likelihood of negotiations being re-opened for a considerable time at least. The shipbuilding industry locally is so brisk and the amount of work on hand so enormous, that the shipbuilding firms almost without exception, are urgent for a supply before the winter. The plant in some of the yards is understood to be inadequate for the demands made upon it, and now that negotiations have hopelessly fallen through it will, perhaps, mean large expenditure in providing new plant. Briefly stated, the Greenock Electricity Committee have decided that they cannot undertake to give a supply to the shipbuilders unless Port Glasgow is willing to furnish a guarantee not to sanction any application by any other competing authority to enter Port Glasgow for a period of thirty years. The Law and Finance Committee of Port Glasgow Town Council refuse to give the thirty years' guarantee, and here matters stand.

Steel Works Extension.—Messrs. David Colville & Sons, Dalzell Steel and Iron Works, Motherwell, in pursuance of a policy adopted several years ago, are at present engaged making extensive additions to their plant and works, which, when completed, will increase the output by 2,000 tons of steel per week. Several acres of ground have been taken in, and new smelting furnaces are to be erected and bar and plate mills of large dimensions laid down. The present extension is expected to be completed and partially working by the beginning of next year.

The Caledon Shipbuilding and Engineering Co., Dundee, with a number of other important contracts, have on hand three passenger steamers to the order of the Argentine Navigation Company, the first of which was sent out the stocks on August 14th. The vessel, which was named *Dublin*, is of the raised quarter deck type, and has been specially designed for service in shallow waters. She is 267 ft. in length overall, 40 ft. moulded breadth, and 11 ft. 6 in. moulded depth. She is of 1,200 tons gross, and will be fitted by her builders with twin sets of quadruple-expansion engines.

TYNESIDE AND WEARSIDE.

(From our Own Correspondent.)

Tyneside.

WORK continues to be very brisk in the shipbuilding and engineering establishments on the Tyne, and the output bids fair to be a record for the year, despite the difficulty in getting material through, caused by the effects of the coal strike.

Messrs. Armstrong, Whitworth & Co., Ltd., are very busy at both the Elswick and Walker yards, and have just received confirmation of the provisional order for a Chilian "Dreadnought." It will be the first large vessel to be built at their new yard at Walker. Although the contract for a Greek cruiser which the firm tendered for, and were expecting to get, has gone to Germany, there is a good deal of work in hand, including a Chinese cruiser and the cruiser *Birmingham* for the British Admiralty, besides the first of the Chilian "Dreadnoughts," and a "Dreadnought" for the Brazilian Government. This latter vessel is the largest they have ever built for the Brazilian Government. A great amount of other work is in hand which will keep the Company fully employed for some considerable time.

Messrs. Swan, Hunter & Wigham Richardson, Ltd., are still very busy with new work and repairs.

Messrs. Palmer's Shipbuilding and Iron Co., Ltd., have all berths occupied. A considerable amount of repair work is in hand, including H.M. torpedo-boat No. 30.

Messrs. John Readhead & Sons, Ltd., are very busy in their yard, and are having a new dry dock constructed to enable them to cope with more repair work.

Messrs. Smith's Dock Co., Ltd., have a considerable amount of repair work on hand, both in the dry docks and afloat.

Messrs. Wallsend Slipway and Engineering Co., Ltd., have a lot of repair work on hand, including H.M.S. *Shark*.

Wearside.

Work is still plentiful in the shipbuilding yards and engineering works on the river. A start has been made at Southwick with a new yard for Messrs. Swan, Hunter and Wigham Richardson, Ltd., and negotiations are proceeding for a new yard on the river for a company of which Lord Furness is the head.

Messrs. William Doxford & Sons, Ltd., are still fully employed, having all the berths occupied, and look like having a record year.

Messrs. Osbourne, Graham & Co. have just launched the steel screw steamer *Reome* which they have specially constructed to the order of Messrs. Fearnley & Eger, of Christiania. This is the fifth vessel they have built for the firm. The vessel has been constructed on the Monitor patent system, and makes the fourth existing vessel of her kind. She is on the single-deck principle, with short poop and long bridge, with all accommodation on top; she carries 3,300 tons on a shallow draught, and is to be equipped with the most modern deck appliances. The engines are to be supplied by Messrs. George Clark & Sons, and will be capable of driving the vessel a speed of nine knots loaded on a low consumption. The firm have also in course of construction another vessel of the same type.

Messrs. S. P. Austin & Son, Ltd., have a collier of 3,000 tons deadweight carrying capacity for London owners fitting out at their quay berth, which was expected to be finished before the end of August. They have also two large colliers on the stocks, and one of them is partly plated, but the difficulty of getting material has seriously handicapped the work on these vessels, or they would have been much further advanced. The ship repairing branch of the Company has been fairly busy this month, the vessels docked included four steamers belonging to one large firm, and were in hand for damage repairs and general overhaul, two being passed through British Corporation special classification survey. A Swedish steamer, which sustained considerable damage at the fore end by running aground when leaving port loaded, after being examined by a diver, was partly discharged, and is now undergoing repairs in graving dock. A locally-owned steamer is also in dock for extensive bottom repairs.

THE TEES AND HARTLEPOOLS.

(From our own Correspondent.)

Middlesbrough.

Messrs. Sir Raylton Dixon & Co., Ltd., Cleveland Dockyard, have a large number of orders on their books and consequently are very busy.

Messrs. Smith's Dry Dock Co. are still very busy on both old and new work. They are reported to have secured the contract to convert the s.s. *Chatham* and the s.s. *Harport* from ordinary cargo steamers to oil tankers for the Deutsche Amerikanische Petroleum Gesellschaft of Hamburg.

Messrs. Richardsons, Westgarth & Co., Ltd., are well booked up with orders for both marine and land engines. They have on hand at present a large blowing engine, the bedplate of which will weigh upwards of 40 tons. Their speciality department is at full pressure and work includes the Nesdrum boiler, which has made good headway for land installations. Mr. Hall Brown has entered upon his duties as general manager, where his varied experience will be of great assistance in the manufacture of the firm's many specialities.

Messrs. W. Harkess & Co., are very busy on both old and new work.

Stockton and Thornaby.

Nothing new is reported from Messrs. Craig, Taylor & Co. Messrs. Richardson, Duck & Co. and Messrs. R. Ropner and Sons still keep busy, but orders are falling off, owing to the rise in prices and the very long delivery now required, as shipbuilders and engineers alike cannot get delivery of material under six months in most cases.

Messrs. Blair & Co. have a large amount of work on hand and are reported to have secured the contract to supply the engines and boilers for a steamer to be built on the Tees.

West Hartlepool.

Both yards of Messrs. W. Gray & Co., Ltd., are at full pressure, and they are reported to have secured the contract to build a steamer about 400 ft. long for the Holland-Amerika Line, an improved steamer on the lines of the s.s. *Shakristan*, recently built by them for Messrs. Strick & Co., and which has been chartered by the Holland-Amerika Line. Sufficient work is in hand for twelve months.

Messrs. Irvine's Shipbuilding & Dry Dock Co., Ltd., Harbour Dockyard, continue very busy on both old and new work. They have secured an order to build a small cargo steamer for Irish owners.

Included in the sale of local-owned steamers during the month, are the s.s. *Crathorne* of 2,642 tons gross, carries 4,100 tons deadweight, owned by Messrs. R. Ropner and Son, sold to Norwegian owners for about £9,000; the s.s. *Haworth*, of 2,372 gross tons, carries 3,450 tons deadweight, sold through Messrs. Wellock & Co. to Michalino Bros. for £7,500, and now resold to Greek owners for about £8,200; the s.s. *Aislaby*, of 2,826 gross tons, carries 4,386 tons dead weight, sold to Messrs. Booth Bros., of London, for about £10,000. Messrs. Rickinson & Son are reported as having sold the s.s. *Amphitrite*, of about 2,305 gross tons. Messrs. Ropner have just sold the s.s. *Elton*, of 2,461 gross tons, carrying 3,900 tons deadweight, to Newcastle owners for about £9,000.

Hartlepool.

The Central Marine Engine Works of Messrs. W. Gray and Co. continue at high pressure. They are to construct the engines and boilers for the steamer to be built by them for the Holland-Amerika Line.

Messrs. Irvine's Shipbuilding & Dry Dock Co., Ltd., Middleton Yard, are reported to have secured the contract to build a cargo boat for Messrs. Houlder Bros., Liverpool.

Messrs. Richardsons, Westgarth & Co., Ltd., are very busy in all departments. They have secured the contract to supply the machinery for the two steamers to be built by the Irvine Co. They are also very busy with accumulators, condensing plants and evaporators.

The s.s. *Time* is still ashore high and dry on Seaton Sands. Work is in progress to dig her out, when it is expected to float her at the next spring tides.

THE HUMBER AND DISTRICT.

(From our Own Correspondent.)

Hull Docks.—The amount of traffic in the docks at present is enormous, this being the wood season from the Baltic ports and Archangel. The arrival of grain cargoes from the River Plate, Black Sea ports and India is keeping lighters and men very busy; in fact, a big steamer has been ordered to proceed to the Tyne to discharge her valuable cargo, owing to the want of dock accommodation at Hull. It will be a boon when the new joint docks are opened at the port in about twelve months' time.

Riverside Quay.—The riverside quay is working this month at full pressure. The North-Eastern Railway Company has much to do in despatching fruit landed on this quay to all parts of the country. The passenger steamers are well booked up and one company had to put on an extra steamer for passengers to Rotterdam.

Coal Wharves.—Coal shipping at the Hull docks is at full swing, and no fewer than 70,000 tons are on order for shipment at one dock, namely, Alexandra Dock, whilst 68,000 tons of coal are in trucks standing on the lines for shipment. A steamer finished loading 6,800 tons in 45 working hours at a single hoist, which is a very quick despatch and at the North-Eastern Company's docks, every crane and coal hoist is also working at full pressure.

Messrs. Woodall & Co., engineers and boilermakers, have been exceedingly busy during the month on the following steamers doing repairs in engine-room and deck:—S.s. *Roly*, s.s. *Anna*, s.s. *Arnold*, s.s. *Peter Maerke*, s.s. *Maud*, s.s. *Ajax*, s.s. *Ailsa*, s.s. *Johanna*, s.s. *Tye*, s.s. *Tarnberg*, s.s. *Flyndersborg*, s.s. *Katholm*, s.s. *Halsa*, s.s. *Bonanza*, s.s. *Tromsoe*, and s.s. *Nordsaen*. The forging department is fully employed with orders from various sources, and the firm is also busy completing orders for Fisher's patent boiler scaling appliances. A great demand for this appliance is anticipated when it becomes known to superintendent engineers.

Messrs. C. D. Holmes, Ltd., engineers and boilermakers.—The engine shop and all other departments are working at top pressure. They have also secured several orders for new engines and boilers for trawlers, drifters, etc., for local and other owners. The branch shop, situated at Alexandra Dock, is fairly well employed with graving dock work, etc.

Thomas Tate, engineers and boilermakers, are well employed in general repairs, opening out engines and boilers for survey. A new boiler has been fitted in the tug *Stanley* and other repairs done. The tug *Rover* is having a new boiler placed aboard. Extensive repairs on s.s. *Hebe*, s.s. *Apollo*, s.s. *Midge*, have been carried out and at present three steamers are being opened out for Lloyd's survey.

Messrs. Cochrane & Sons.—This progressive firm are still booking orders for local and foreign owners, and have just received orders for coasters, tug boats and trawlers for Vancouver, Iceland and Russia. They recently launched (broadside) the s.t. *Lord Carrington*, for the Yorkshire Steam Fishing Co., Ltd., of Hull. Boiler and machinery will be supplied by Messrs. C. D. Holmes & Co., Ltd., of Hull. She is built to Lloyd's requirements.

Messrs. The Central Dry Dock Co., Ltd.—This old-established firm still keep to the front with heavy repair work. This month shows a considerable increase of work, and at the present time they are very busy in all departments. The s.s. *Dalmally* is in dock with broken stem and considerable damage to shell plates, floors and frames in the fore peak and fore tank. The s.s. *Olympia* is also in the graving dock (Alexandra Dock) with ice damage necessitating the removal of over twenty plates, etc. The s.s. *Overdale* is undergoing survey and is going into dry dock; s.s. *Fenchurch* is going into graving dock. There is also a considerable amount of damage to deck plates and fittings, and a new mast, derricks, etc., will have to be fitted; s.s. *Avala* has undergone Lloyd's survey and bottom sighted; s.s. *Mashlands* and s.s. *Argo* have also been in graving dock. In addition a large amount of work has been dealt with on steamers in the docks afloat. The firm's graving dock is well booked ahead for steamers coming to discharge their cargoes at Hull.

Messrs. Cooper & Co., Ltd., engineers and ship repairers.—The Neptune Works of this Company are keeping fairly busy in all their special departments. The Company's own graving dock has been kept engaged with several coasting steamers and extensive repairs have been effected on the Scarborough passenger steamer *Cambria*, which went on the rocks outside Scarborough with about 1,000 passengers on board during a fog. Her bottom has had very extensive repairs besides deck and engines, etc. The vessel is now again on her station at Scarborough. The branch shop at Alexandra Dock has had a fair amount of repair and graving dock work. The firm has booked several good orders for repairs on steamers coming to this port.

Messrs. Amos & Smith, Ltd., engineers and boilermakers, have all their departments very busy with new and repair work, but only one set of triple-expansion machinery and boilers booked during the month. Enquiries, however, are very numerous. The branch shop is well employed with graving dock work on several steamers of the Wilson Line and outside firms. The West Dock outside staff are busy opening out machinery and boilers for Board of Trade and Lloyd's surveys.

Messrs. North-East Coast Engineering Works, Ltd., have had a very successful month with engine and boiler repairs, etc., on the following steamers:—S.s. *Ardmount*, s.s. *Garfield*, s.s. *Alnwell*, s.s. *Elsa Partiss*, s.s. *Crown*, s.s. *Henrich*

[illegible] Five of the before-mentioned steamers have been in the graving dock overhauled and several plates renewed in bottoms, besides drawing in tail shafts for inspection and renewing propellers, lifting rudders, etc. This firm have booked several steamers coming to this port for some heavy repairs and are looking forward for another good month.

Messrs. Stewart & Craig, engineers and ship repairers, have been busy on the following steamers: the sailing ship *Leyland Brothers*, now renamed *Empresa Nacional*, of Lisbon, alteration of deck hatches, etc., for coal hulk purposes; the s.s. *[illegible]*, s.s. *Ivor*, s.s. *Gower*, s.s. *Ebor*, s.s. *Rhondane* and s.s. *Clee* have all undergone repairs in engine-room and deck.

SOUTH OF ENGLAND AND ISLE OF WIGHT.

(From our Own Correspondent.)

Messrs. Day, Summers & Co., Ltd., Northam Iron Works, Southampton.—The above firm have booked an order for a set of 60-ton floating sheers for Spain. Good progress is being made with the work in hand, despite delay in deliveries of steel. The new (750 tons) yacht building for Mr. Bibby was launched last month. The engines are well advanced. The firm are also completing another set of 60-ton sheers, but the work on the pontoon has been delayed, due to non-delivery of material. The new tugboat, which the firm are building for Messrs. Liebig's Extract of Meat Co., is now plated. The s.s. *Mermaid*, of Trinity House, was at the yard last month for damage repairs and survey.

Messrs. J. Samuel White & Co., Ltd., East Cowes, Isle of Wight.—Good progress has been made during the past month, and before closing for the annual ten days' works holidays a further batch of naval pinnaces were sent round in tow to London for shipment to the States for the Argentine battleships building there. The large Chilian destroyers are progressing rapidly, and the first vessel will shortly be ready for launching.

Salvage Station at Southampton.—According to the "Southampton Times," the Liverpool Salvage Association will shortly establish a salvage station at Southampton. The steamer *Linnet* will be stationed here, and Lieutenant Dathan, R.A., one of the Association's officers, will be permanently here in charge of the *Linnet* and the plant. The steamer will bring her own divers and men, and she will probably be fitted with wireless telegraphy apparatus.

The Royal Mail Steam Packet Co.'s second "D" steamer the *Demerara* sailed from Liverpool on the 16th of last month on her maiden voyage in the intermediate service to the River Plate. She has been specially built for the carriage of chilled and frozen meat and fruit. The refrigerating machinery consists of two compound duplex marine type CO_2 machines constructed by Messrs. J. & E. Hall, Ltd., of Dartford, Kent. There are about thirty miles of brine piping in the various insulated chambers. Full particulars of this "D" class of vessel have appeared in previous issues. See August issue.

Messrs. John I. Thornycroft & Co., Ltd., Southampton.—Work is proceeding satisfactorily on the destroyers *Hardy*, *Paragon*, *Porpoise*, *Unity* and *Victor*, and on two others provisionally ordered. The bridge main and lower decks of H.M. paddle tug *Sturdy* are completed as far as possible before shipping the machinery. The sister vessel, H.M. *Strenuous*, is following closely. Both the shallow-draught ferry steamers are in frame. Good progress has been made with the Diesel-engined yacht. The deck beams are being made and the shell plating galvanized for the motor passenger vessel for New Zealand. The firm have received an order from the Lobitos Oilfields, Ltd., for an 80-ft. sea-going motor cargo vessel of composite build, and the keel will shortly be laid. General and Repairs.—The usual amount of general work has been carried out during August, and the repairs department has been busy with work on dockyard craft, troopships, liners, yachts, etc.

IRON AND STEEL INSTITUTE.—The autumn meeting will be held at Leeds on September 30th, October 1st, 2nd, 3rd and 4th.

THAMES.

(From our Own Correspondent.)

The Ending of the Great Dock Strike.—It is a fact that can not be gainsaid that this strike, which has been so serious and widespread in its effects, has really ended now. The leaders made every effort for its continuance, but in the end it fizzled out ignominiously. There were no longer any funds to go on with and other unions failed to keep the game going. The windy warfare on Tower Hill and elsewhere ceased and the strikers failed to respond to their leaders when there was nothing to draw upon, and, as we have reported already, returned to work hundreds at a time. Employers to continue business at their works brought in men from the outside, this was not done without a desperate struggle, fights occurring and revolvers being used. That deaths have not resulted is a wonder considering how desperate the situation at times was. Happily, however, we are now enabled to report peace established. The firmness on the part of the masters all through has been a marked feature of the dispute, with the results we now know. The men's leaders tried to federate all the unions, but here, as in their other endeavours, they were not successful, and thus the strike beginning towards the middle of May only terminated finally on July 27th, and naturally some time after this before things really settle down in their accustomed manner. It was the Seamen's and Firemen's Union that saved the situation, and in the long run this must tend to the benefit of the men and the unions generally, as we may be assured means would have been found to prevent the strikers from overturning the trade of the port entirely, which was what they started to do. Men will now be taken on inside the docks to suit the conditions of the employers, and it will also be possible to engage free men as well as those of the union. The cost has been prodigious all round, but at no gain to the men whatever, in fact large numbers of them have lost their work as well as £140,000 of Union funds.

London v. Southampton.—With the great advances in the size of shipping London has not lagged behind of late, as we know, and one company, the Royal Mail, is now said to be contemplating despatching three or four boats from London for South America in the future, to call *en route* either at Southampton or a French port. The boats chosen are said to be the *Vandyke*, *Arragon*, *Danube* and *Clyde*, and these will be in the nature of extra boats.

The Union Castle Line.—The South African mail contract is reported settled, and the service to be inaugurated by the building of at least three new vessels of a speed mentioned of 20 knots and a tonnage of 15,000. If this is the case it will be seen to be a great advance and must alter the conditions at present existing as regards South African travel entirely. The vessels will have triple screws and a combination of turbine and reciprocating engines. It is also said the vessels are to be used as armed cruisers for war purposes if needed, so the policy of the South African Government is a far-seeing one if this is so.

Port of London.—The latest improvement foreshadowed is for an extension of the East India Dock by which 28 ft. depth will be given instead of 26 ft., while the lock giving access to the import dock will be widened to 80 ft. and considerably lengthened. Thus a total area of 32 acres will be available close to the City for a large class of steamer. There are also extensions in progress at Tilbury, 1,480 ft. of extra quayage being provided there. This will be available for the largest liners, for which this dock principally caters.

PUBLISHERS' ANNOUNCEMENT.—Our thirty-fifth annual volume commenced with the August number. Volumes 34, containing numbers from August, 1911, to July, 1912, comprising nearly 500 pages of highly interesting matter, are now ready for delivery at the following rates:—7/6 per vol.; by post, securely packed, United Kingdom and Canada, 8/-; other countries, 8/6. Binding cases may be obtained from the Publishers, price 1/6 each, carriage 3d. extra. A very complete index to volume 34 was issued with the August number, and each bound volume contains a copy of the Index.

MERSEY AND MANCHESTER SHIP CANAL.

(*From our Own Correspondent.*)

AUGUST may claim to have been a red-letter month with the Mersey port the 32,000-ton floating dock, having been very successfully floated out of its mud dock and towed to Portsmouth. Other large Admiralty work in progress also will suffice to revive the claim of this district as one of the great shipbuilding centres. The dock labourers at the Birkenhead Docks have now resumed work after several weeks' strike, due to a refusal to take out the new insurance tallies.

Messrs. Cammell, Laird & Co.—Perhaps no firm can claim to successfully build a greater variety of sea-going craft than that turned out by Messrs. Cammell, Laird & Co. Besides the regular output of torpedo-boat destroyers, one may refer to the destroyer *Swift*, launched in 1907, one of the most remarkable vessels having a speed of 36 knots, and one which did so much to establish the use of oil fuel successfully. This vessel was of an unique type, having four shafts and having water-tube boilers of the straight type. It is stated that this vessel cost about £250,000 to build and to put through her extensive trials. More recently the new type of Admiralty vessel, the tenders to submarine depot ship *Adamant* and *Alecto*, may be referred to. The former is now stationed at Portsmouth and the latter at Dundee. The latest new type of structure to be built at Tranmere is the 32,000-ton floating dock, which was launched on August 14th, and at once left for Portsmouth. It is understood that on the advice of the Dock Boards water bailiff, Mr. Mace, this huge structure was towed across the Banks and not through the buoyed passages, since its light draught was only 6 ft. This dock reached Portsmouth safely on August 21st. It is hoped to launch the *Audacious* early in September. The *Melbourne*, Australian protected cruiser, is fast nearing completion in the fitting-out basin. The L. & N.W. Railway steamer took up her station on the Greenore-Holyhead route on August 8th and proved herself to be in every way a valuable addition to this Company's fleet. The repair department have been steadily employed, having had the Isle of Man Co.'s steamer *Prince of Wales* for repairs due to damage sustained at the Prince's Stage; the same Company's steamer, *Queen Victoria* and *Mona's Queen* have also been in hand. The Cork Steamship Co.'s steamer *Kenmare* has returned to her station after being reboilered. The Midland Railway Co.'s steamer *Londonderry* is in for overhaul of her turbines. The Mersey Bunkering Co.'s steam barge *Enterprise* is having considerable alterations, including larger hatchways and other improvements, to suit her for the requirements of the port. The steam trawler *Hector* is in for damage repairs due to grounding on the West Coast of Ireland.

The Mersey Docks and Harbour Board.—It is authoritatively stated that Mr. Miles Kirk Burton, the present general manager and secretary to the Dock Board, will retire about September 1st. Mr. Burton has spent his whole commercial life with the Dock Board, *viz.*, fifty-five years. He is the son of Superintendent Burton, late of the Liverpool Corporation. He was educated at Liverpool College, and at once entered the Board's service, where he rose step by step until when a few years ago when the competition with Manchester was at its keenest, the Board's administration by committee was severely criticised. The outcome was the appointment of Mr. Burton as general manager. Thus Mr. Burton had the autocratic power to take any action at once that he felt was required. The sense of such power has, however, had the reverse effect upon the personality of Mr. Burton, for a more kindly courteous gentleman, and at the same time keen business man, it would be hard to find. Mr. Burton thus became one of the four chief administrators of the Board's affairs, his colleagues being the engineer-in-chief, Mr. A. G. Lister, the solicitor, Mr. William C. Thorne, and the treasurer, Mr. R. I. Powell. Mr. Miles Kirk Burton has recently been placed on the Commission of the Peace for Liverpool. It is understood that Mr. Alfred Chandler, assistant secretary to the Board, and a man who by his courteous tact and ability, is worthy of the prospective honour, will succeed to the position.

Wireless Installation on Blackpool Tower.—This installation is now in full working order and is in charge of Captain Barrett Coulston, R.E., and was inspected by General Mackinnon on Aug. 10th. On each side of the Tower poles have been thrust out and attached to these are wires which run to the top of the flagstaff. Messages have been received from the Eiffel Tower, from Poldhu, Clifton in Ireland, and from several steamers of the Isle of Man Steam Packet Co.

The White Star Line.—It is authoritatively stated that the White Star Co. have instructed Messrs. Harland & Wolff to construct a double shell in the mammoth liner now building at Belfast. It is understood that a space of about 3 ft. will be left between the inner and outer shells, thus occupying some quarter of a million cubic feet and costing between £70,000 and £80,000. The *Adriatic* reports that on a recent passage an iceberg 1,000 ft. long and 300 ft. high was passed in plain view of all on board. The passengers were at luncheon, but quickly hurried on deck to see the suggestive object which was soon left behind, the ship being turned in a southerly direction.

The late Mr. Joseph Bell.—Mr. Joseph Bell, the late chief engineer of the ill-fated *Titanic*, has left estate of the gross value of £6,457 2s. 10d. Probate of his will dated 21st January, 1906, with three codicils, has been granted to his widow, Mrs. Maud Bell, and his brother-in-law, Mr. William Ralph Bates, ironworks manager, both of Oaklands, Somercotes, Alfreton, Derbyshire. All the property was left upon trust for his wife, with remainder to his children in equal shares.

Atlantic Crossed in Motor Boat.—The 35-ft. motor launch *Detroit*, in command of Captain Day, reached Queenstown on August 7th after a voyage of three weeks. The weather experienced was terrific, but the engines never gave out. The crew of four were well and were delighted to step ashore at Queenstown.

The "Empress of Britain."—This vessel arrived in the Mersey on August 14th from Quebec, after being in collision with the Liverpool steamer *Helvetia*, off the St. Lawrence. She was berthed in the Sandon Dock for unloading and inspection.

NORTH-WEST OF ENGLAND.

(*From our Own Correspondent.*)

Barrow-in-Furness.—There is a big rush of work in all the departments of the great works of Messrs. Vickers, Ltd., at Barrow, as practically all the orders in hand are for early delivery, and great things are being accomplished, as the facilities at the disposal of the firm enable work to proceed in such a way as to realize the utmost possible results under the circumstances. During the past month the firm have completed the British battle-cruiser *Princess Royal*, which is now at Plymouth ready for her builders' trials, and the huge floating dock built for Montreal, which is now on its way to the St. Lawrence river for delivery before the ice season sets in. These are two big orders successfully accomplished, and they represent something like examples of what Messrs. Vickers' can do in the several departments of shipbuilding, engineering, and in the work of arming ships of war for effective service.

H.I.J.M. "Kongo."—The work of fitting up the Japanese battle-cruiser *Kongo* is making considerable headway, and now that the *Princess Royal* is away from the fitting-up wharf in the Buccleuch Dock, more and more men are being employed on the Japanese vessel, which is of heavier tonnage, of equal fighting power, but not quite so fast in speed. The *Kongo*, in fact, marks an improvement in many respects on the *Princess Royal*, and the Japanese experts who are in Barrow in connection with the building of this vessel are very proud of her, and believe she will be a very great acquisition to the Mikado's navy. Two similar vessels are being built in Japan from the same plans. Some time ago it was stated that in all probability another warship would be built at Barrow for the Mikado's navy, but of late nothing has been heard of the proposal. The *Kongo* will be ready for her trials early next year, and with this view a great strength of men is being employed on her in all departments. The vessel is to be delivered within two years of the time when the keel was laid, which is a big thing to accomplish. By the time the *Kongo* is ready for her trials, two battleships, one for the British and the other for the Turkish navy,

will be ready to take part when the 200 ton crane in the Broadoak Dock, and in the meantime smaller vessels will be dealt with at the 200 ton crane in the Devonshire Dock.

The "Reshad V."—This Turkish battleship is beginning to assume something like shape. More men are available to work on the ship now that the Montreal floating dock is away, and as the material is ready to them hands the vessel is known to be growing every day. The terms of delivery are very exacting it being generally understood that she is to be delivered in twenty two months from the time of laying her keel. If this work is accomplished the achievement will be still more marked than in the case of the British "Dreadnought" *Vanguard*, which was completed in under two years. No firm could possibly do a job of this sort unless they had the most up-to-date facilities in every department of the works.

H.M.S. "Delhi."—Much weight has been added to this vessel since her keel was laid, and quite an army of workers are employed on her construction. She is a big ship, being one of the super Dreadnoughts, and her design provides for strength of hold to be in harmony with the heavy armament she has to carry, and to withstand the shock of a broadside of 13·5 guns. She, in fact, represents the strongest fighting ship ever built at Barrow. Vast improvements have been made in this class of battleship since the *Vanguard* was built at Barrow a few years ago. Her engines and other fitments are being proceeded with so as to be ready to lower into her hold when she is launched. No time is being lost in the details of construction.

The Brazilian River Gunboats.—These three gunboats building for the Brazilian Government are being laid down. They are remarkable vessels, which, while being shallow in order to navigate the rivers of Brazil, are nevertheless to be mounted with very destructive guns to be used in maintaining peace in the interior of the Republic. The firm has just completed a powerful tugboat for the Brazilian Government, and it is now making its way to the east of South America.

Submarines.—Messrs. Vickers, Ltd., are very busy in the construction of several submarines for the British Admiralty of the "E" class, and it is expected other important orders will soon follow. It is certain this department of Messrs. Vickers' works will be kept busily employed for some time to come, as it is known that the "E" class of submarine is a very powerful and necessary adjunct to the British navy, and as its utility has been so fully demonstrated, the need of plenty of these useful vessels is clearly understood, not only by naval experts, but by those who have studied the purpose for which submarine craft are constructed.

Engineering.—The engineering branches of Messrs. Vickers' works at Barrow are now recognised as the most up-to-date in the world, and they seem to be ever growing bigger. They are very full of orders at present, not only in connection with the shipbuilding orders proceeding at Barrow, but with work incidental to ships building by other firms, and ships in the hands of the Vickers' firm in Spain, Nickolieff and elsewhere, and there is also an immense business being done in gun mountings.

Steel. The steel trade is very busily employed, and orders are largely held for all classes of shipbuilding material. Ship plates are at £8 5s. to £8 7 6d. per ton, and boiler plates £8 15s. to £9.

Hæmatites.—There is quite a boom in the hæmatite iron trade, and prices are ruling high at 79/6 to 80/- per ton nett f.o.b.

BELFAST.

(From our Own Correspondent.)

Messrs. **Harland & Wolff** have at present five new steamers fitting out, representing an aggregate of upwards of 51,000 tons. Three of these are for the Royal Mail Steam Packet Co., the *Oxfordshire* for the Bibby Line, and the twin-screw passenger steamer *Abosso*, which is the latest vessel to be launched from the Queen's Island. She was put in the water from the south end of the yard on 15th August, and has a length of 425 ft., beam 57 ft., and gross tonnage of about 8,000. The new vessel has been built to the order of the African Steamship Co. On 8th August the new twin screw steamer *Demerara* left Belfast to take up her station on the Royal Mail Steam Packet Co.'s service between Liverpool and South America. The three Royal Mail boats above referred to are sister ships of the *Demerara*, which is a vessel of 517 ft. length, having a gross tonnage of about 11,500, and readers of THE MARINE ENGINEER are already familiar with the detailed description of these vessels. Messrs. Harland & Wolff are stated to have had a further order for two steamers placed with them by the same owners.

Messrs. Workman, Clark & Co.—It is reported that this firm has also secured the order for two new steamers for the Royal Mail Steam Packet Co. They have a big volume of new tonnage under construction, and will put several vessels of large dimensions in the water before their output for the year is complete. On 16th August they launched from their South Yard a twin-screw fruit steamer named *Pastores*, which they have built for the general fruit-carrying trade between New York and West Indian ports. The *Pastores* is 480 ft. long with a gross tonnage of 8,000. Luxurious accommodation for 150 first-class passengers has been provided. The propelling machinery consists of two sets of quadruple-expansion engines, steam being supplied by three double-ended and one single-ended boilers. Upon the same day on which the *Pastores* was launched, they put in the water a large floating caisson, the first of two being constructed by them for the British Admiralty. It is intended for the new dock at present building at Portsmouth for the new super-"Dreadnoughts." The pumping arrangements for sinking and floating are controlled by an approved system of compressed air.

The Institution of Mechanical Engineers.—The members of this institution spent a very enjoyable week in Belfast at the beginning of the month. A number of instructive and interesting papers were read, and visits were paid to a some of the leading works and factories in the city. The social side was not neglected by any means, dinners, luncheons, a reception and a garden party contributing to the enjoyment of the members and their friends. Messrs. Harland and Wolff entertained the visitors to luncheon, this function being voted by every one present one of the most enjoyable features of the week.

LAUNCHES AND TRIAL TRIPS.

LAUNCHES—English.

Yucca and Balsense.—On July 2nd, there was launched from the yard of Messrs. Cochrane & Sons, Selby, a steel screw trawler, the principal dimensions being 110 ft. by 21 ft. by 12 ft. 9 in. moulded. The vessel has been built to the order of Messrs. Sellick, Morley & Price, Milford Haven, and will be replete with all the latest improvements for the fishing trade. She will be fitted with powerful triple-expansion engines by Messrs. C. D. Holmes & Co., Ltd., Hull. As the vessel left the ways she was gracefully christened *Yucca*. On the same date there was launched a small fishing vessel, the principal dimensions being 68 ft. 6 in. by 17 ft. 6 in. by 6 ft. 10 in. moulded. The vessel has been built to the order of Messrs. Companhia de Pescarias Balsense No Algarve, Tavira, Portugal, and will be fitted with compound surface-condensing engines by Messrs. Crabtree and Co., Ltd., Great Yarmouth. As the vessel left the ways she was gracefully christened *Balsense*.

Bridgeport.—On July 4th, Messrs. Wm. Doxford & Sons, Ltd., launched from their yard at Pallion, Sunderland, the s.s. *Bridgeport*, built to the order of The Bridgeport Steamship Co., Ltd., London. The dimensions of the vessel are:—Length, 456 ft.; breadth, 58 ft.; moulded depth, 28¾ ft. Deadweight capacity, 11,000 tons. During construction the vessel has been superintended by Mr. R. J. Marshall, Newcastle. The classification is with the British Corporation. Messrs. Doxford are supplying the engines and boilers.

Siljestad.—On July 15th, there was launched from the yard of The Sunderland Shipbuilding Co., Ltd., a handsomely-modelled steel screw steamer, built to the order of Messrs. A. F. Klaveness & Co., of Lysaker. The principal dimensions of the vessel are:—Length, 380 ft.; breadth, 50 ft. 9 in.; and depth moulded, 28 ft. 6 in. She is of the single-deck

type, with poop, bridge and forecastle, and will take Norske Veritas highest class under special survey. The deadweight carrying capacity is about 7,400 tons on a light draught. Accommodation for captain, officers and engineers is provided on bridge deck, the whole being heated by steam. A large saloon in polished hardwood is also fitted in the bridge house. The crew and firemen are accommodated in the poop. The deck machinery, which is worked by a large multitubular donkey boiler, consists of ten steam winches by Messrs. Clarke, Chapman & Co., Ltd., steam windlass, and a steam-steering gear placed at after end of engine-room. Ample provision is made for the quick discharge of cargo, and the holds are almost entirely free from pillars. The main engines are by the North-Eastern Marine Engineering Co., Ltd., Sunderland, and have cylinders 25 in., 42 in., 68 in. by 45 in. stroke, steam being supplied by two large boilers working at a pressure of 180 lbs. per square inch. During construction the vessel has been inspected by Messrs. C. A. Bushel, Nicol and Co., Newcastle, and Capt. Anderson.

Flixton.—On July 15th, Messrs. William Gray & Co., Ltd., launched the handsome steel screw steamer *Flixton*, which they have built for The Deddington Steamship Co., Ltd. (Messrs. H. Samman & Co., managers), Hull. She will take the highest class in Lloyd's Register, and is of the following dimensions, *viz.* :—Length overall, 392 ft. ; breadth, 51 ft. ; and depth, 27 ft. 3 in., with extra long bridge, poop and topgallant forecastle. The saloon, state-rooms, captain's, officers' and engineers' rooms, etc., will be fitted up in houses on the bridge deck and the crew's berths in the forecastle. The hull is built with deep frames, cellular double bottom and large after and fore-peak ballast tanks, eight steam winches, steam-steering gear amidships, hand-screw gear aft, patent direct steam windlass, large horizontal multitubular donkey boiler, steel shifting boards, stockless anchors, telescopic masts, and all requirements for a first-class cargo steamer. Triple-expansion engines are being supplied by the Central Marine Engine Works of the builders, having cylinders 26 in., 42 in. and 70 in. diameter with a piston stroke of 48 in., and three large steel boilers for a working pressure of 180 lbs. per square inch. The vessel and machinery have been built under the superintendence of Mr. Walter Sage, M.I.N.A., of Hull, on behalf of the owners.

Hornfels.—On July 16th, Messrs. Craig, Taylor & Co., Ltd., launched from their Thornaby Shipbuilding Yard, Stockton-on-Tees, a handsomely-modelled screw steamer of the following dimensions :—374 ft. by 50 ft. by 31 ft. 4 in. moulded to bridge deck. She is built of steel to the highest class in Lloyd's Registry, and has long poop and topgallant forecastle, large water-ballast capacity in double bottom, fore and aft, and in peaks ; she is equipped with patent direct steam windlass with quick-warping ends, steam-steering gear, eleven steam winches, double derricks and gaffs to each mast, stockless anchors, large hatches, and all the latest improvements for rapid loading and discharging. The masts have been arranged to suit the Manchester Ship Canal requirements ; steel shifting boards are fitted throughout the holds and 'tween decks for carriage of grain cargoes. The accommodation for captain, spare rooms and officers is neatly fitted up in deckhouses amidships on bridge, the engineers being in deck-houses alongside engine casing, and the crew in the forecastle. Her engines have been constructed by the North-Eastern Marine Engineering Co., Ltd., Sunderland, the cylinders being 25 in., 41 in. and 68 in. by 45 in. stroke, with two large boilers working at 180 lbs. pressure, including Howden's system of forced draught, etc. The vessel has been built to the order of H. C. Horn, Esq., of Lubeck, under the superintendence of Captain Bartelt and Mr. B. Schmidt, assisted by Captain Ernst Thoms and Mr. A. Schomer, and is a duplicate of the s.s. *Luise Horn*, recently built by Messrs. Craig, Taylor & Co., Ltd., for the same owner. This is the third vessel built by Messrs. Craig, Taylor & Co., Ltd., for the same owners, and is a duplicate of a vessel recently launched by them under the same name, but since transferred to the Deutsche Levante Linie, Hamburg, and re-named the *Haidar Pascha*.

Nurtureton.—On July 16th, Messrs. Ropner & Sons, Ltd., Stockton-on-Tees, launched from their shipbuilding yard a steel screw steamer of the following dimensions, *viz.* :—Length, 429 ft. ; breadth, 55 ft. ; depth, 34 ft. 7½ in. The vessel will be classed 100 A1 at Lloyd's, having main deck and complete awning deck fore and aft. The accommodation for the captain is in a deckhouse amidships, and the officers and engineers will be located in the after 'tween decks, and crew in the 'tween decks forward. The vessel has been built to the order of Messrs. R. Chapman & Son., Newcastle, and has double bottom for water ballast on the cellular principle all fore and aft, and in fore and after peaks. She will be fully equipped with an up-to-date outfit, including quick-warping steam windlass, stockless anchors, steam steering gear amidships and powerful screw gear aft. The appliances for loading and discharging cargoes expeditiously are very complete, and include six steam winches, double derricks to each hatch, steam being supplied by a large auxiliary boiler working at 180 lbs. pressure per square inch. The engines will be of the triple-expansion type, by Messrs. Blair & Co., Ltd., Stockton-on-Tees, of about 2,000 I.H.P., having two steel boilers 16 ft. 9 in. by 11 ft. 6 in., 180 lbs. pressure.

Manchester Citizen.—Recently The Northumberland Shipbuilding Company, Ltd., launched from their yard at Howdon, the finely-moulded steamer *Manchester Citizen*, which has been built for the Manchester Liners, Ltd. The vessel is 390 ft. long by 49 ft. beam by 29 ft. deep, and has been built under special survey to the highest class at Lloyd's. She is fitted with long bridge, long poop, topgallant forecastle, the accommodation, which is very ample, being placed in steel houses on the bridge-deck. The 'tween decks are lofty, and so arranged that cattle, troops or emigrants may be carried, if necessary. Careful attention has been given to the loading and discharging gear, and a complete outfit for the rapid handling of cargoes arranged for, consisting of nine steam winches by Messrs. Clarke, Chapman & Co., Ltd., a large number of cargo derricks and steam windlass by Messrs. Emerson, Walker & Thompson Bros. She is fitted with the usual water ballast arrangements for light passages. The machinery will be supplied by Messrs. Richardsons, Westgarth & Co., Ltd., Sunderland, consisting of engines with cylinders 25 in., 41 in., 69 in. by 48 in. stroke, three large steel boilers with 180 lbs. pressure. The vessel will carry about 7,500 tons on a light draught and steam about 10 knots loaded at sea. Messrs. Wailes, Dove & Co.'s "Bitumastic" enamel has been applied throughout the bunkers, boiler-room tank and boiler space, and their patent "Bitumastic" covering to the tank tops. The trial trip was run on the 8th August, when a speed of 11¼ knots was obtained. The vessel then proceeded on a voyage to the United States.

Turbo.—On July 11th, there was launched from the yard of Messrs. Sir James Laing & Sons, Ltd., at Deptford, an up-to-date oil steamer built to the order of the Anglo-Saxon Petroleum Co., Ltd. The vessel is a bulk oil steamer, but she is also adapted for carrying general case-oil cargoes. Her principal dimensions are :—Length, 390 ft. ; breadth, 50 ft. 6 in. ; and moulded depth, 29 ft. 3 in. She has a deadweight carrying capacity of 6,600 tons, and is fitted with sixteen main oil tanks and fourteen summer tanks, in addition to being equipped with oil fuel bunkers. The machinery is placed aft. There is amidships a powerful installation of pumping machinery to enable the vessel to discharge from either side or over the stern. The propelling machinery, by Messrs. J. Dickenson & Sons, of Sunderland, consists of three multitubular boilers working at 180 lbs. pressure, and triple-expansion engines with cylinders 22 in., 44 in. and 72 in. in diameter, and 48 in. stroke.

Adorna.—On July 15th, Messrs. Sir W. G. Armstrong, Whitworth & Co., Ltd., launched from their Walker Shipyard a large steel screw steamer intended for the carriage of petroleum in bulk. The vessel has been built to the order of the Anglo-American Oil Co., Ltd., of London, and transferred by them to the Deutsch-Amerikanische Petroleum-Gesellschaft, of Hamburg. The chief dimensions of the vessel are :—Length over all, 428 ft. ; breadth extreme, 55 ft. 3 in. ; depth moulded, 32 ft. 10½ in. The vessel is capable of carrying about 9,000 tons on a moderate draught of water, and has been built under special survey to the highest class in Lloyd's Register. For ventilating the oil compartments a steam fan is fitted. The propelling machinery has been manufactured by the Wallsend Slipway and Engineering Co., Ltd., of Wallsend-on-Tyne, and is of the quadruple-expansion type, with cylinders 24 in., 35 in., 50½ in. and 73 in. by 48 in. stroke, supplied with steam by three boilers 16 ft. 3 in. in diameter by 12 ft. long, working at a pressure of 220 lbs.

Channel Queen.—On July 27th, there was launched at [illegible] the handsomely modelled steel screw passenger and cargo steamer *Channel Queen*. This vessel has been specially designed for the London and Channel Islands trade, and is being built to the order of the London and Channel Islands Steamship Co., Ltd., London. She will have a Board of Trade Certificate for about 150 first class passengers. The dimensions of the vessel are 185 ft. over all by 28 ft. moulded. She is designed to carry a good cargo on light draught. Triple expansion engines of good power will be fitted. The hull and engines have been built under the superintendence of Mr. J. Aitken, of Ilford, Essex.

Fauvette.—On July 18th, there was launched from the Cleveland Dockyard, Middlesbrough, a handsomely modelled steel screw steamer which Sir Raylton Dixon & Co., Ltd., are building to the order of the General Steam Navigation Co., Ltd., of London, to fulfil the very special requirements of their extensive passenger service between London and Bordeaux, etc. The vessel will receive Lloyd's highest classification, and will comply with the British Board of Trade and Home Office regulations. She is 327 ft. long by 44 ft. by 30 ft., depth moulded to shelter deck, and is of the two deck type with shelter, bridge, boat and forecastle decks. The steamer will be fitted out in a most luxurious manner with accommodation for 106 first-class passengers. The state-rooms, with dining saloon, will be found on the shelter deck, having large entrance house on the bridge deck above. At the fore end of this deck there will also be two special cabins, a music room and ladies' boudoir, while at the after end of the bridge deck will be the smoking-room. The whole of these rooms will be furnished in a most elegant style; they are large and comfortable and contain fold-up lavatory with mirror, steam heater, electric bell, lights and fans, etc., and the two special cabins will be furnished in most artistic style. Captain's and officers' accommodation and chart-room will be provided on fore end of boat deck with flying bridge on top. The engineers and firemen will be located on the main deck abreast engine room and the sailors in forecastle. One of the most unique features of the ship is that she will have a complete installation of electrically driven auxiliary machinery, consisting of six cranes, two winches, windlass, two capstans, etc., and in conjunction with this there will be installed on board a large generating plant. The 'tween decks are exceptionally high, being specially arranged for the conveyance of horses, motor cars, etc. The ship will have two masts, a 20-ton derrick, and a complete installation of electric light, including clusters for discharging cargo, electric bells and fans, steam heating, bath-rooms, lavatories, etc., large refrigerating plant with chamber for the preservation of fresh meat, vegetables, etc., five watertight bulkheads, boat accommodation in excess of number of passengers and crew carried, wireless telegraphy, and all the latest innovations for the comfort and safety of those on board. Triple-expansion engines having cylinders 28 in., 46 in. and 76 in. by 48 in. stroke, supplied with steam by three large single-ended boilers working at 180 lbs. pressure, will be fitted by Messrs. The North-Eastern Marine Engineering Co., Ltd., Wallsend-on-Tyne.

Cardiff Hall.—On July 26th, Messrs. Wm. Doxford and Sons, Ltd., launched from their yard at Pallion, the steamship *Cardiff Hall*, built to the order of Messrs. Edward Nicholl and Co., Cardiff. The dimensions of the vessel are:—Length, 360¾ ft.; breadth, 50¾ ft.; moulded depth, 28 ft. Deadweight capacity, 7,150 tons. The classification is with the British Corporation, and Messrs. Doxford are supplying the engines and boilers.

San Jose.—On July 30th, Messrs. Wood, Skinner & Co., Ltd., successfully launched from their shipbuilding yard at Bill Quay, Newcastle-on-Tyne, a finely-modelled steel screw steamer which has been built to the order of Mr. Otto Thoresen, of Christiania. The vessel is designed for and fitted with all modern arrangements for the fruit carrying trade of Otto Thoresen's Line, Canary Islands and London, and has special ventilation as well as deck machinery, steel derricks, gear and electric lighting to expedite the loading and discharging of cargo with the utmost possible despatch. She has two complete steel decks, the upper one being sheathed and has specially large water ballast capacity. The accommodation is amidships and comprises saloon and passenger berths in a large steel deckhouse, with captain's room and chart-room in house above, while the officers' and engineers' quarters are in houses on each side of the engine casing and the crew's accommodation aft. The vessel will be fitted with propelling machinery by Messrs. North-Eastern Marine Engineering Co., Ltd., of Wallsend on Tyne, of the improved triple-expansion type, having cylinders 22 in., 36 in., 60 in. by 39 in. stroke, supplied with steam by three large multitubular boilers worked at a high pressure and fitted with Howden's forced draught and Schmidt's superheating arrangements. With this machinery the vessel will develop a speed of 12½ knots loaded. Both the ship and engines have been constructed to the requirements of Det Norske Veritas for their highest classification and to the specification and under the supervision of Mr. Carl Conradi, of Christiania. On completion the steamer, which is a sister vessel to the s.s. *San Andres* and s.s. *San Mateo*, recently constructed by the builders for the same owners, will be commanded by Capt. Thorbjornsen, of Christiania.

Hillingdon. On July 30th, there was launched from the shipbuilding and repairing establishment of Messrs. S. P. Austin & Son, Ltd., the steel screw steamer *Hillingdon*, of 2,750 tons deadweight capacity, which has been built to the order of Messrs. Wm. Cory & Son, Ltd., of London, and is the twenty-third vessel constructed for the same owners. She will be classed 100 A1 in Lloyd's Register, under special survey. Large water ballast capacity is provided and there are large hatchways specially adapted for the owners' coal trade. Accommodation for captain and officers is fitted in the poop, and for engineers in houses on after end of bridge and for crew in the forecastle. The machinery will be supplied by Messrs. George Clark, Ltd., of Southwick Engine Works. Messrs. Wailes, Dove & Co.'s "Bitumastic" enamel has been applied throughout the bunkers and their patent "Bitumastic" covering to the tank top under boilers.

Marmion.—On July 31st, Messrs. Irvine's Shipbuilding and Dry Docks Co., Ltd., launched from their Harbour Dockyard, West Hartlepool, the steel screw steamer *Marmion*, built for Messrs. The Pyman Steamship Co., Ltd., West Hartlepool (Messrs. George Pyman & Co., managers). The dimensions of the vessel are 387 ft. in length by 51 ft. 3 in. beam extreme by 27 ft. 3 in. depth moulded, carrying over 7,300 tons on a moderate draught. She is built to Lloyd's highest class, having a single deck of steel, with poop, long bridge and forecastle, and water ballast is carried in cellular double bottom and fore and after peaks. The vessel is constructed with deep frames without side stringers, giving clear holds for the stowage of bulky cargoes, wood grain divisions are fitted throughout to Board of Trade requirements, and the steamer is divided into seven water-tight compartments by means of six bulkheads. Large hatches are provided, together with the latest facilities for the rapid loading and discharging of cargo, including ten powerful steam winches exhausting into a Winch condenser and ten derricks. A powerful quick-warping steam windlass is fitted forward, with steam-steering gear amidships and hand gear aft. The captain, officers and engineers are berthed in large houses amidships fitted with coal stoves, the crew and firemen being berthed in the forecastle. The lighting, ventilating and sanitary arrangements have received special attention, the most improved methods being adopted throughout. Triple-expansion engines will be supplied and fitted by Messrs. Blair & Co., Ltd., Stockton-on-Tees, having cylinders 25 in., 42 in. and 68 in. by 48 in. stroke, with two large single-ended boilers and one auxiliary boiler, all connected up to the main engines and working at a pressure of 180 lbs. per square inch.

G. E. Foster and Andrew Kelly.—On July 31st, there were launched from the yard of Messrs. Cochrane & Sons, Selby, two steel screw trawlers, the principal dimensions being 118 ft. by 22 ft. by 12 ft. 3 in. moulded. The vessels have been built to the order of Messrs. The Atlin Construction Co., Prince Rupert, British Columbia, and will be fitted with powerful triple-expansion engines by Messrs. C. D. Holmes and Co., Ltd., of Hull.

Arachne.—On July 31st, Messrs. William Gray & Co., Ltd., launched the handsome steel screw steamer *Arachne*, which they have built for Messrs. Rickinson, Sons & Co., West Hartlepool. She will take the highest class in Lloyd's Register and is of the following dimensions, *viz.*:—Length overall, 372 ft.; breadth, 49 ft., and depth, 28 ft., with long bridge, poop and topgallant forecastle. The saloon, state-rooms, captain's, officers' and engineers' rooms, etc., will be fitted up in houses on the bridge deck and the crew's berths

in the forecastle. The hull is built with deep frames, cellular double bottom and large aft-peak ballast tank, nine steam winches, steam-steering gear amidships, hand-screw gear aft, patent direct steam windlass, large horizontal multitubular donkey boiler, shifting boards throughout, stockless anchors, telescopic masts, with fore and aft rig and all requirements for a first-class cargo steamer. The holds, bunkers and topsides are coated with Siderosthen solution to prevent corrosion. Triple-expansion engines are being supplied by the Central Marine Engine Works of the builders, having cylinders 25 in., 40½ in., and 67 in. diameter, with a piston stroke of 45 in., together with two large steel boilers for a working pressure of 180 lbs. per square inch.

Bittern.—On August 10th, the steamship *Bittern* was successfully launched from the Neptune Works of Messrs. Swan, Hunter & Wigham Richardson, Ltd. This vessel has been built and engined at the Neptune Works to the order of the Cork Steamship Co., Ltd., of Cork, and is the twenty-third steamer built and engined at those works for that company. The *Bittern* is 285 ft. in length by 38 ft. beam, and will carry over 2,700 tons deadweight on 19½ ft. draught. She is being built to attain the highest class at Lloyd's. Her propelling machinery will consist of a set of triple-expansion engines supplied with steam by two boilers. The vessel is expected to have a speed of 11 knots per hour. She is intended for the service carried on by the Cork Steamship Co. between Liverpool, Manchester and Dutch and Belgian ports, for which purpose she is amply supplied with the most improved loading and discharging gear.

Kenmore.—On August 12th, Messrs. Richardson, Duck and Co., Ltd., launched from their yard a finely-modelled steel screw steamer of the following dimensions :—Length overall, 375 ft. ; breadth extreme, 50 ft. ; depth moulded, 27 ft. 2 in. ; gross tonnage, about 3,870 tons. This vessel, which has been built to the order of Messrs. Wm. Johnston and Co., Ltd., of Liverpool, is on the Isherwood system of construction, will take the highest class in British Corporation Registry, and has been built under special survey. She is of the single-deck type, with a tier of main deck beams on which a sparred wood deck will be fitted. The erections are poop for cargo, bridge amidships, with accommodation for captain, officers and engineers in houses on bridge deck, and topgallant forecastle for crew. A cellular double bottom throughout and peak tanks are fitted for water ballast, and equipment includes electric light throughout, six steam winches (five fitted with Wilson's patent chain drive), double derricks throughout, including two 12-ton derricks, derrick tables and crosstrees on masts, steam windlass with quick-warping ends, stockless anchors, steam-steering gear, etc. The engines by Messrs. Geo. Clark, Ltd., Sunderland, have cylinders 24 in., 40 in., 67 in. by 45 in. stroke, steam being supplied by two main and one auxiliary single-ended boilers, having a working pressure of 180 lbs.

Reime.—On August 13th, Messrs. Osbourne, Graham and Co., launched from their yard at Hylton the steel screw steamer *Reime*, which they have specially constructed to the order of Messrs. Fearnley & Eger, of Christiania, being the fifth vessel they have built for this firm. The vessel is of special interest, owing to the fact that she has been built on the Monitor patent system and makes a fourth existing vessel of this type. She is on the single-deck principle, with short poop and long bridge, with all accommodation on top. Rooms for the captain and officers are tastefully fitted out in hardwood and are of large size. The vessel carries 3,300 tons on a shallow draught and is equipped with the most modern deck appliances. She has been constructed under special rules to Norske Veritas Survey, and also fulfils the requirements of Sjfartskontoret Rules. Water ballast is in both peaks and throughout double bottom, thus enabling steamer to take long passages light with the greatest safety. As the vessel left the ways she was christened by Miss Houston, daughter of J. Houston, Esq., of Sunderland, under whose supervision the hull and machinery are being built. After the launch the vessel proceeded direct to the works of Messrs. George Clark, Ltd., who will supply the machinery, which will be capable of driving the vessel a speed of 9 knots loaded, and owing to the type of construction the low consumption of 11 tons is safely anticipated.

Yorkmoor.—On August 13th, there was launched from the shipbuilding yard of Messrs. John Readhead & Sons, Ltd., West Docks, South Shields, a steel screw steamer, built to the order of Messrs. Walter Runciman & Co., Newcastle-on-Tyne. The vessel is of the improved single-deck type, and is built to Lloyd's highest class and under their special survey. She is 381 ft. in length by 51 ft. by 27 ft. 8¼ in., with poop, extra long bridge and top gallant forecastle, and is fitted throughout with shifting boards and grain feeders in compliance with the requirements of the Grain Loading Act, and well equipped with a large number of steam winches and derricks for the rapid handling of cargoes. Steel houses are constructed on the bridge deck for accommodation of captain and officers, engineers and apprentices. She has a double bottom for water ballast, as well as a large after-peak tank. The vessel will be fitted with triple-expansion engines, also constructed by Messrs. John Readhead & Sons, Ltd., having cylinders 26 in., 42 in. and 69 in. with 48 in. stroke, steam being obtained from two large steel boilers of 180 lbs. working pressure. There is also a large marine type donkey boiler.

Thyra Menier.—On August 13th, the Blyth Shipbuilding and Dry Docks Co., Ltd., launched from their yard the steel screw steamer *Thyra Menier*, which has been built on the Arch principle of construction, Ayre-Ballard patent, to the order of the Donald Steamship Co., Ltd., of Bristol. The vessel has been designed and constructed from the plans and under the direction of Mr. Maxwell Ballard. Built to Lloyd's highest class, her dimensions are 230 ft. between perpendiculars, by 36 ft. breadth moulded. She is of the single deck type with poop, topgallant forecastle for the crew and accommodation for officers in deckhouses amidships. Propelling machinery of ample power will be supplied by Mr. G. T. Grey, South Shields, and the vessel will be fitted with deck machinery of the most improved type for efficient and economical handling of cargoes.

Denby Grange.—On August 14th, the Northumberland Shipbuilding Co., Ltd., Howdon-on-Tyne, launched the finely-moulded steamer *Denby Grange*, which has been built to the order of Messrs. Furness, Withy & Co., Ltd., West Hartlepool, for the Houlder Line. The vessel is 390 ft. long by 49 ft. beam by 29 ft. deep, and has been built under special survey to the highest class at British Corporation. She is fitted with long bridge, long poop and topgallant forecastle. Accommodation in steel houses on bridge deck. The 'tween decks are lofty and so arranged that cattle, troops or emigrants may be carried, if desired. There are nine steam winches by Messrs. Clarke, Chapman & Co., Ltd., a large number of cargo derricks and steam windlass by Messrs. Emerson, Walker & Thompson Bros. The usual water ballast arrangements for light passages are fitted. The machinery will be supplied by Messrs. Richardsons, Westgarth & Co., Ltd., of Sunderland, consisting of engines with cylinders 25 in., 41 in., 69 in. by 48 in. stroke, three large boilers with 180 lbs. pressure. The vessel will carry about 7,500 tons on a light draught and steam about 10 knots loaded at sea.

Baharistan.—On August 14th, Messrs. William Gray and Co., Ltd., launched the handsome steel screw steamer *Bahristan*, which they have built for Messrs. Frank C. Strick & Co., Ltd., of Swansea and London. She will take the highest class in Lloyd's Register and is of the following dimensions, *viz* :—Length overall, 371 ft. 6 in. ; breadth, 51 ft., and depth, 25 ft 1½ in., with extra long bridge, poop and topgallant forecastle. The saloon, state-rooms, captain's, officers' and engineers' rooms etc., will be fitted up in houses on the bridge deck and the crew's berths in the forecastle. The hull is built with deep bulb-angle frames, cellular double bottom and large aft-peak ballast tank, ten steam winches, steam-steering gear amidships, hand-screw gear aft, patent direct steam windlass, stockless anchors, telescopic masts with fore and aft rig, boats on deck overhead and all requirements for a first-class cargo steamer. Triple-expansion engines are being supplied by the Central Marine Engine Works of the builders, having cylinders 25 in., 40½ in. and 67 in. diameter with a piston stroke of 45 in. and three large steel boilers for a working pressure of 180 lbs. per square inch.

Willerby.—On August 14th, Messrs. Ropner & Sons, Ltd., Stockton-on-Tees, launched from their shipbuilding yard a steel screw steamer of the following dimensions, *viz* :—Length, 358 ft. 6 in. ; breadth, 50 ft. 10 in. ; depth, 25 ft. 8 in. The vessel will be classed 100 A1 at Lloyd's, having main deck, poop, bridge and topgallant forecastle. Accommodation for captain, officers and engineers in houses on bridge deck, crew in the forecastle. The vessel has double bottom fo

water-ballast tanks for regular trawl work, and in the fore and aft peaks. She will be fully equipped with an up-to-date outfit including quick warping windlass, stockless anchors, steam steering gear and ships' and powerful screw gear aft. The appliances for loading and discharging cargoes expeditiously are very complete, and include nine steam winches, two derricks to each hatch, steam being supplied by a large donkey boiler working at 100 lbs. pressure per square inch. The engines will be of the triple-expansion type by Messrs. Blair & Co., Ltd., Stockton on Tees, of about 1,500 i.h.p., having two steel boilers 13 ft. by 10 ft. 6 in., 180 lbs. pressure of steam.

Lord Carrington.—On August 15th, there was launched from the yard of Messrs. Cochrane & Sons, Selby, a steel screw trawler the principal dimensions being 133 ft. 4 in. by 25 ft. by 12 ft. 9 in. moulded. The vessel has been built to the order of Messrs. The Yorkshire Steam Fishing Co., Ltd., of Hull, and will be replete with all the latest improvements for the fishing trade. She will be fitted with powerful triple-expansion engines by Messrs. C. D. Holmes & Co., Ltd., of Hull.

Fullerton.—On August 15th, Sir Raylton Dixon & Co., Ltd., launched from their Cleveland Dockyard, Middlesbrough, a fine steel screw collier, which they are constructing to the order of Messrs. The Denaby and Cadeby Main Collieries, Ltd., of London, etc. The vessel is being built to Lloyd's 100 A1 class and is of the single-deck type with poop, long bridge and forecastle. Her principal dimensions are 325 b.p. by 47 ft. by 23 ft. 6 in. depth moulded, and she will carry about 5000 tons on a light draught of water. Saloon and accommodation for captain will be provided on bridge amidships. The engineers and officers will be berthed in houses at sides of engine casing and the crew in forecastle. The vessel will have five hatches, eleven derricks, ten winches, two masts, three derrick posts, hand and steam-steering gear, and all the most modern appliances for the rapid handling of cargo. Triple-expansion engines, having cylinders 24 in., 40 in. and 65 in. by 42 in. stroke, supplied with steam by three large single-ended boilers working at 180 lbs. pressure will be fitted by Messrs. George Clark, Ltd., Sunderland.

Glace Bay.—On August 15th, Messrs. Wm. Doxford and Sons, Ltd., launched from their yard at Pallion, Sunderland, the s.s. *Glace Bay*, built to the order of the Glace Bay Steamship Co., Ltd., London. The dimensions of the vessel are :—Length, 460 ft.; breadth, 58 ft.; moulded depth, 28¾ ft. Deadweight capacity, 11,000 tons; draught, 28 ft., and she has been designed and built to meet the special requirements of the Dominion Coal Co. for rapid loading and discharging. The classification is with the British Corporation. Messrs. Doxford are supplying the engines and boilers.

LAUNCHES—Scotch.

Strathcarron.—On July 19th, the Greenock and Grangemouth Dockyard Company launched from their Greenock yard the steel screw cargo steamer *Strathcarron*, which they have built to the order of Messrs. Burrell & Son, Glasgow. The dimensions of the vessel are :—Length, 390 ft.; breadth, 52 ft. 3 in.; and depth, 28 ft. The steamer has a deadweight carrying capacity of 7,150 tons on a 23-ft. draught. The machinery will be supplied by Messrs. John G. Kincaid & Co., Greenock.

Novara.—On July 27th, there was launched at Greenock a twin-screw steamer of about 7,000 tons gross, built for the intermediate class of the Peninsular and Oriental Steam Navigation Company's fleet. The new vessel, which is a duplicate of the *Nankin*, put into the water in May last, was named *Novara*. The principal dimensions are :—Length, 466 ft.; breadth, 52 ft.; depth, 34 ft. 6 in. The *Novara* is classed 100 A1 at Lloyd's. Accommodation has been provided for first and second-class passengers. Messrs. Matthew Keenan and Co., Ltd., have applied their non-conducting composition to all boilers and steam pipes.

Benmohr.—On July 30th, there was launched at Greenock, by Messrs. Scott's Shipbuilding and Engineering Company, a steel screw steamer which they have built to the order of Messrs. William Thomson & Co., Leith, for the Ben Line of steamers, trading between this country and the Far East. The principal dimensions of the vessel are :—Length, 405 ft.; breadth, 51 ft. 3 in.; depth, 29 ft. 1 in., and gross measurement nearly 5,000 tons. The vessel has a cut-water stem, bowsprit, and carved figurehead, and differs from the ordinary cargo carrier, not only in appearance but in equipment. Accommodation for officers and for a few passengers is provided in houses on the bridge deck, while the native crew is accommodated in the topgallant forecastle. The arrangements for dealing with cargo are of a very complete nature, and in addition to the fourteen ordinary mast and post derricks there is one capable of lifting 30 tons. All the derricks are of steel, and the winches are of a very heavy type. The machinery, which has been constructed by the builders, consists of one set of triple-expansion engines having cylinders of 20 in., 43 in. and 72 in. diameter, with a 48-in. stroke. Steam is supplied by three large single-ended boilers constructed to Lloyd's requirements for a working pressure of 100 lb. per square inch.

Chagres.—On July 30th, Messrs. Alex. Stephen & Sons, Ltd., Linthouse, launched the twin-screw steamer *Chagres*, the latest addition to the fleet of Messrs. Elders & Fyffes' fruit and passenger steamers trading between the West Indies, Central America and this country. Her dimensions are :—Length, 415 ft.; breadth, 51 ft.; depth, 32 ft. 3 in., with a gross tonnage of about 5,000 tons. The vessel is a noteworthy example of Messrs. Elders & Fyffes' progressive policy, as she is not only considerably larger than the four previous steamers built by Messrs. Stephen for the same firm, but emphasises the important step from single to twin-screw propulsion, with its accompanying increase in speed and enhanced safety from breakdown. Although the vessel is primarily designed for the fruit trade, a special feature has been made of the spacious one-berth and two-berth state rooms for the accommodation of fifty passengers on the bridge deck, at the forward end of which is the dining-saloon and main entrance hall, with easy access from the latter to the promenade deck entrance and music saloon above. At the after-end of the promenade deck is situated the smoke-room and verandah café. The comfort of the passengers has been kept foremost in view throughout, including special refrigerating machinery and chambers for keeping cool and fresh the meat, fish, dairy produce, vegetables, wines, etc., for their use, while their safety is specially provided for by an installation of wireless telegraphy, submarine signalling and ample lifeboat accommodation for every person on board. The characteristic feature of the vessel is the insulated hold storage of 250,000 cubic feet capacity for carrying fruit, in conjunction with special and adequate facilities for the rapid loading and discharging of fruit cargoes in the expert handling of which Messrs. Elders & Fyffes are now so famous. Two sets of triple-expansion engines, with cylinders 20 in., 34 in. and 57 in., with a stroke of 48 in., with the necessary boilers for developing sufficient power to give the steamer a high speed on service, have been constructed and fitted by the builders.

Crown of Seville.—On August 10th, Messrs. Russell & Co., Port Glasgow, launched a cargo steamer which they have built to the order of Messrs. Prentice, Service & Henderson, Glasgow. The vessel is 455 ft. in length, 56 ft. 3 in. in breadth, 39 ft. in depth moulded to shelter deck, and of about 5,800 tons gross. The steamer is built to the highest class of the British Corporation, in accordance with Board of Trade requirements for cargo steamers. The vessel also conforms to the Board of Trade requirements for a passenger certificate. The steamer, which is specially designed for her owners' Eastern trade, is fitted with twin masts with a bridge between the two fore-masts, and a very complete outfit of derricks, including a heavy derrick to lift 30 tons. Messrs. Dunsmuir and Jackson, Govan, will supply engines with cylinders 28 in., 46 in., 77 in. diameter respectively, with a 54-in. stroke and four multitubular boilers. During construction the vessel was superintended by Mr. Thomas Niccol and Captain Smith, who is to command her, and the machinery by Mr. Louis Findlay, Glasgow. Messrs. Matthew Keenan and Co., Ltd., have the contract to apply their non-conducting composition to all boilers and steam pipes.

Nicosian.—On August 12th, there was launched from the shipbuilding yard of Messrs. David & William Henderson and Co., Ltd., at Partick, Glasgow, the large steel screw steamer *Nicosian*, of about 6,350 tons gross, which they have built to the order of Messrs. Frederick Leyland & Co., Ltd., Liverpool. This addition to the already large fleet of vessels owned by Messrs. Leyland is 400 feet long between perpendiculars by 52 ft. 2 in. broad by 30 ft. 7 in. depth

moulded, is classed in Lloyd's 100 A1 and fulfils the requirements of the Board of Trade for their passenger certificate. She is rigged as a two-masted schooner, and has an exceptionally large number of powerful derricks, which, with eight steam winches, provide ample means for the rapid handling of large cargoes. Comfortable accommodation is provided on shelter-deck amidships for passengers, also for officers, engineers, etc., while the petty officers and crew are berthed in houses on the shelter deck. The machinery, which has been constructed by the builders, consists of quadruple-expansion engines, having cylinders 23½ in., 34 in., 49 in. and 70 in. diameter by 51-in. stroke, with steam from three boilers at 215 lbs. pressure. The vessel and machinery has been constructed under the supervision of the owners' superintendents, Captain Fry and Mr. Wm. Scott, assisted by Mr. McClymont.

Warrener.—Messrs. John Fullerton & Co., Paisley, recently launched the steamer *Warrener*, of 650 tons deadweight, which they have built to the order of Messrs. George Wills and Co., London and Port Adelaide, S.A., for their trade on the coast of Australia. Triple-expansion engines of 700 I.H.P. will be supplied by Messrs. Ross & Duncan, Govan. The steamer has been built under the supervision of Captain H. A. Thomson, who is to be in command.

Ardeola.—The Caledon Shipbuilding and Engineering Company, Dundee, recently launched a passenger and cargo steamer for Messrs. Yeoward Bros., Liverpool. The vessel, which was named *Ardeola*, is 321 feet in length, 24 feet in breadth (moulded), 21 feet 6 inches in depth (moulded), and 3,100 tons gross. Triple-expansion engines will be supplied by the builders.

Willochra.—On August 14th, Messrs. Wm. Beardmore and Co., Dalmuir, launched the last of the three twin-screw steamers which they have on hand for the Adelaide Steamship Co., of South Australia. These vessels, which have been specially designed for the requirements of the Company's important passenger service round the coasts of Australia, have a large carrying capacity and good speed at sea. Their general dimensions are :—Length, 410 ft. between perpendiculars ; breadth, 56 ft. 6 in. ; depth moulded to the upper deck, 28 ft., and tonnage, about 8,000 gross and 5,000 deadweight. The hulls and machinery have been constructed under special survey to the British Corporation's highest class, and the vessels will be completed in accordance with the Board of Trade regulations for passenger steamers. Superior accommodation is provided on the three principal decks for about 250 first, 120 second, and 60 third-class passengers. The first and second-class lounges, music and smoking-rooms are situated on the promenade deck, and the state-rooms for these two classes are on the shelter-deck, while their dining-saloons, pantries and galley are on the upper deck. The propelling machinery consists in each vessel of two sets of quadruple-expansion engines, with six water-tube boilers of the Babcock & Wilcox type, and all the most recent improvements for efficiency and economy.

Coombar.—On August 15th, there was launched from the yard of Messrs. Murdoch & Murray, Ltd., Port Glasgow, a steel twin-screw steamer for the North Coast Steam Navigation Co., Sydney, N.S.W. The dimensions of the vessel are :—Length, 165 ft. ; breadth, 30 ft. ; depth moulded, 10 ft. 9 in., with quarter-deck and topgallant forecastle. A large deadweight will be carried on a very light draught. The order for the vessel was placed by Messrs. Hendry, McCallum & Co., Glasgow, and during construction both hull and engines have been built under their supervision, as well as the Board of Trade and British Corporation. After the launch the vessel was towed to Glasgow, where the machinery will be fitted on board by Messrs. David Rowan & Co.

Jonio.—Messrs. Mackie & Thomson, Govan, launched on the 15th August the twin-screw steamer *Jonio*, which they have built for Italian owners. The *Jonio* is a sister ship to the *Adriatico*, which was built recently by the firm for the same owners. Both vessels have been specially designed for the fast passenger and mail service in the Adriatic. Their general dimensions are :—Length overall, 236 ft. ; breadth, 34 ft. ; depth moulded to the upper deck, 19 ft., and the gross measurement about 1,400 tons. The *Jonio* has been constructed to the special survey of the British Corporation,s highest class and to that of the Registro Nazionale Italiano. Superior accommodation is provided for about 200 first, second and third-class passengers on the upper and promenade decks. The propelling machinery which will be fitted by Messrs. Muir & Houston, Glasgow, consists of two sets of triple-expansion engines, supplied with steam by two single-ended boilers. During construction the hull and machinery were under the supervision of Signor A. Lovri, the Company's naval architect.

LAUNCH—Irish.

Abosso.—On August 15th, Messrs. Harland & Wolff, Ltd., Belfast, launched the twin-screw passenger steamer *Abosso*, built to the order of the African Steamship Company, London (Messrs. Elder, Dempster & Co., Ltd., Liverpool, managers). The new vessel is 425 feet long between perpendiculars and 57 feet beam, with a gross tonnage of about 8,000. The vessel is built on the latest principle of watertight construction, with double bottom extending right fore and aft. She has five steel decks, and will have sumptuous accommodation for a large number of first and second-class passengers, also for a number of third-class, the state-rooms being large and airy, and the public rooms exceptionally fine, the dining-saloon extending the full breadth of the vessel ; and the lounge and smoke-rooms are situated in the best parts of the ship. The arrangements for working ship and cargo are of the latest and most approved type, and the vessel will have a wireless telegraph installation. There will be a complete installation of electric light, and the propelling machinery consists of two sets of four-cylinder quadruple-expansion balanced reciprocating engines, also constructed by the builders of the vessel.

TRIAL TRIPS.

Wyola.—On July 17th, the screw tug and salvage steamer *Wyola*, which has been constructed by Messrs. Jos. T. Eltringham & Co., of South Shields, to the order of the Swan River Shipping Co., Ltd., of Perth, Western Australia, was taken to sea on her official trial trip. Everything proved highly satisfactory, and a mean speed of over 11½ knots was attained on the measured mile, the machinery, which has been constructed at North Shields, giving every satisfaction and developing about 1,100 I.H.P. The vessel is fitted with all the latest appliances for heavy sea towing and salvage work, her outfit including electric light, with Morse signalling lamp, and a very powerful centrifugal salvage pump capable of delivering 4,000 gallons per minute. After the trial the vessel returned to the yard of the builders to take in stores previous to leaving for Fremantle, Western Australia.

Nervion.—On July 18th, Messrs. Osbourne, Graham & Co. sent to sea for her official trial trip the steel screw steamer *Nervion*, which they have specially constructed to the order of Messrs. Fearnley & Eger, of Christiania, being the first foreign-owned vessel built on the "Monitor" principle. She is on the single-deck principle, with short poop and long bridge, with all accommodation on top. The vessel was fully loaded and the trial resulted in her obtaining a mean speed of 9½ knots. This was very satisfactory to all concerned. For Launch, see July issue.

West Point.—On July 20th, the s.s. *West Point* proceeded on her official trial trip in Hartlepool Bay. Throughout the trial the engines and all auxiliaries worked splendidly, the owners' representative expressing entire satisfaction, but owing to the inclement weather it was impossible to attempt a speed trial, and after adjusting compasses the vessel proceeded to Liverpool under command of Captain Clarke. For Launch, see August issue.

Eddystone.—On July 22nd, this new steel screw steamer, built by Messrs. Richardson, Duck & Co., Ltd., to the order of the Fargrove Steam Navigation Co., Ltd. (Messrs. Farrar, Groves & Co., managers), of London, was taken to sea for her trial trip. Amongst those present attending the trial trip were Mr. F. W. Bardens, representing the owners, Mr. John Carmichael, representing the shipbuilders, and Mr. F. Shepherd, representing the engine-builders, Messrs. Blair and Co., Ltd. A series of speed trials was undertaken off the Tees Bay and a mean speed of 12¼ knots attained. For Launch, see August issue.

Hornfels (to be re-named *Haidar Pascha*).—On July 23rd, the handsomely-modelled steel screw steamer *Hornfels* (to be re-named *Haidar Pascha*), built by Messrs. Craig, Taylor and Co., Ltd., Thornaby Shipbuilding Yard, Stockton-on-Tees, to the order of Mr. H. C. Horn, Lubeck, was taken

to sea for her official trial trip. During the run everything worked with the greatest smoothness, and a speed of about 12 knots was maintained. Captain Bartelt (representing Mr. H. C. Horn), and Mr. Bock (representing the Deutsche Levante Linie), and Captain Krohn, of the Deutsche Levante Linie, were on board the vessel, and all expressed themselves as being very highly pleased with the ship and engines. Immediately after the trial trip the vessel left for Archangel under command of Captain Ernst Thoms. For Launch, see July issue.

Hesleyside.—On July 24th, the s.s. *Hesleyside*, lately launched by Messrs. Short Brothers, Ltd., of Pallion, Sunderland, to the order of the Charlton Steam Shipping Co., Ltd., of Newcastle, left the Wear for her official trials, when all passed off satisfactorily. She is a single-deck vessel, with cargo poop, bridge and topgallant forecastle, built to the Isherwood system of longitudinal framing, and will take Lloyd's highest class. Her leading dimensions are:—Length, 375 ft.; beam, 50 ft.; and depth moulded, 28 ft. 4 in., and she is designed to carry a large deadweight on a moderate draught. Cellular double bottom is fitted, all fore and aft, and both peaks are arranged for water ballast. Accommodation for officers is provided in a steel deckhouse on fore end of bridge, with saloon neatly panelled in oak, for the Captain in the house above, for the engineers and petty officers in deckhouse on bridge-deck abreast of casing, and for the crew in the topgallant forecastle. Eight steam winches, steam windlass, steam-steering gear fitted in engine-room and controlled from standard on flying bridge and connected by steel wires to quadrant aft, with hand-steering gear aft, are fitted. Eight derricks are provided to main hatches worked from strong tables on masts, and the cross bunker hatch is worked by two derricks swung from Samson posts, which are also to act as wing ventilators to stokehold. The holds are specially arranged to be as far as possible clear of obstruction to permit of large pieces of machinery being shipped. The propelling machinery has been fitted by Messrs. the North-Eastern Marine Engineering Co., Ltd., Sunderland, and consists of triple-expansion engines with cylinders 25 in., 41 in., 68 in. diameter, and a stroke of 48 in., taking steam from three large multitubular boilers working at 180 lbs. pressure.

Uskmoor.—On July 26th, the trial trip was run of the screw steamer *Uskmoor*, built for Messrs. Walter Runciman and Co., of Newcastle and London, by Messrs. John Blumer and Co., of North Dock, Sunderland. The vessel attained a speed of over 11 knots on four runs over the measured mile. The owners were represented by Mr. W. P. Henry and Mr. N. Blachford, their superintendents, under whose supervision both ship and engines have been constructed. For Launch, see August issue.

Shahristan.—On July 29th, the large steel screw steamer *Shahristan* was added to the fleet of vessels owned by Messrs. Frank C. Strick & Co., Ltd., of Swansea and London. Amongst those on board to witness the trial were Mr. Archibald Walker, who has superintended the building of the vessel, Mr. R. Marshall, representing the Board of Trade, and Messrs. M. P. C. Petri and J. G. Bolsius, of Rotterdam. The performance of vessel and machinery was highly satisfactory, a speed of 13 knots being obtained. For Launch, see August issue.

Mitra.—On July 30th, the oil-tank steamship *Mitra* was successfully tried at sea, off the mouth of the river Tyne. This is one of the three sister ships that Messrs. Swan, Hunter and Wigham Richardson have in hand for the Anglo-Saxon Petroleum Company, Ltd., of London, and is the fourth they have already built for these owners. The vessel is 418 ft. long by 51 ft. 3 in. broad, with a moulded depth of 31 ft. The engines and boilers of the *Mitra* have been built by the Wallsend Slipway and Engineering Company. The main propelling machinery consists of a set of triple-expansion surface-condensing screw engines, steam being supplied by three single-ended boilers. The latter are fitted with the oil-burning installation designed by Mr. R. A. Meyer. The boilers are arranged with separate uptakes, so that each can be worked independently of the others. In addition to the main boilers a donkey boiler is provided of the horizontal multitubular marine type. The deadweight carrying capacity of the *Mitra* is 7,800 tons. The forward hold is designed to carry general cargo and the remaining holds petroleum oil or benzine in bulk. At each end of the range of these oil-carrying compartments a cofferdam is placed. All the oil holds are subdivided by oil tight longitudinal and transverse bulkheads, and they are fitted with gas freeing and steaming out apparatus. The pumping arrangements are of the most modern type. In the bridge amidships there is comfortable accommodation for the captain, officers and apprentices. The engineers have their mess room and berths at the after end of the vessel, close to the engine-room, while the accommodation for the crew is provided in the forecastle.

Athamas.—On August 2nd, the s.s. *Athamas*, built and engined by Messrs. Wm. Doxford & Sons, Ltd., Pallion, Sunderland, to the order of Messrs. A. A. Embiricos & Co., London, ran a successful fully-loaded trial, when a mean speed of 10 knots was obtained. The vessel is 382 ft. long, 51 ft. broad, 25 ft. moulded depth. Deadweight, 7,000 tons. During construction the vessel has been superintended by Mr. A. Kairis. Classification is with the British Corporation. For Launch, see August issue.

Sheaf Arrow.—On August 3rd, the trial of the s.s. *Sheaf Arrow*, which has been built upon the Arch patent principle of construction, took place, and was entirely successful. The vessel loaded her first cargo in a markedly satisfactory way, and gave great satisfaction to all concerned. A progressive trial was run and a speed of $11\frac{3}{4}$ knots under loaded sea conditions was reached. Turning trials were undergone, and the vessel proved herself to be more than usually handy, turning in a very short circle and causing most favourable comments from those in charge. After completion of the trials, the vessel proceeded on her maiden voyage to Cronstadt. For Launch, see August issue.

Greenore.—On August 8th, the *Greenore*, built for the London and North Western Railway Co., completed her final trials, and was at once put upon the Greenore Holyhead service. The general dimensions of the boat are—Length between perpendiculars, 305 ft.; breadth moulded, 40 ft., depth moulded to bridge deck, 23 ft. 3 in. The vessel has been built to Lloyd's special class and to Board of Trade survey, and has been designed to Mr. Holland's specifications specially for the Irish trade. Sleeping accommodation is provided for 176 first-class passengers in state-rooms and there are two cabins-de-Luxe which may be engaged for 10s. per night. The open space in the main deck has been fitted for the carriage of cattle and horses. The machinery consists of three Parsons turbines driving three shafts, steam being supplied by five Babcock & Wilcox boilers at 160 lbs. pressure, Howden's forced draught being installed. The vessel has a sea speed fully loaded of 21 knots, being a knot faster than any other boat in the service. Two new features have been installed in this Company's boats, *viz.*, turbines and water tube boilers. Steam can be raised in these boilers in thirty or forty minutes as against six hours for the Scotch boiler. Other features are the fitting of thermo tanks, Weir's feed pumps, Sees Ash ejectors and steering gear by Messrs. Brown of Edinburgh.

Demerara.—On August 8th, the fine twin-screw passenger steamer *Demerara*, constructed for the Royal Mail Steam Packet Company by Messrs. Harland & Wolff, Ltd., left Belfast for Liverpool to take up her position on the R.M.S.P. South American passenger service from Liverpool. Her dimensions are as follows:—Length, 517 ft. 3 in.; breadth, 62 ft. 3 in.; gross tonnage about 11,500 tons. The *Demerara* is due to leave Liverpool on the 10th August, to take up her position in the R.M.S.P. intermediate service to South America from that port.. For Launch, see January issue.

Boscastle.—On August 9th, the handsome steel screw steamer *Boscastle*, built by Messrs. Wm. Gray & Co., Ltd., West Hartlepool, for Messrs. E. Jenkins & Co., of Cardiff, was taken to sea for her trial trip. The trial was a very satisfactory one, a speed of 10 knots being maintained under full loaded conditions. The owners were represented by Mr. F. G. Daniel (of Messrs. N. T. & F. G. Daniel, Cardiff), who has superintended the building of ship and machinery, and Mr. J. W. Stuart was present on behalf of Lloyd's Registry. For Launch, see August issue.

Caxias.—On August 10th, the steel paddle steamer *Caxias*, which has been designed and constructed by Messrs. James Pollock, Sons & Co., Ltd., of Lloyd's Avenue, E.C., for Brazilian clients, ran her trials on the Tyne with most satisfactory results. The vessel, which is to serve not only as a passenger and cargo steamer, but also as a tug, attained a mean speed of 10·31 miles per hour, which was ·61 miles over

that contracted for. The *Caxias* is of the three-deck type, with teak main and promenade decks, and pitch-pine awnmg deck. Extensive accommodation has been provided on the promenade deck. She has four large cargo holds with a carrying capacity of 60 tons, her draught at that load being 3 ft. 6 in. The propelling machinery consists of two independent sets of diagonal compound non-condensing engines, each set driving a paddle-wheel; coupling gear is arranged so that both sets can be connected together if desired. The boiler is of the return tube type of extra large size, and fitted with two furnaces, the working pressure being 150 lb. The *Caxias* will make the voyage to South America in tow of the *Tury Assu*, which Messrs. Pollock, Sons & Co., Ltd., have just completed for the same clients.

Warley Pickering.—On August 12th, the handsome steel screw cargo steamer *Warley Pickering*, built to the order of the Constantine & Pickering Steamship Co., Middlesbrough, left the Tees for her official trials, which passed off most satisfactorily to all concerned. For Launch, see August issue.

Motor Ship, Eavestone.—The recent departure of the first large British-owned motor ship, the *Eavestone* (built by Messrs. Sir Raylton Dixon & Co., Ltd., Middlesbrough), on her maiden voyage from Sunderland, was followed by a successful passage to Antwerp, the journey being performed without a hitch of any kind. The four-cylinder vertical Diesel engine by which this new vessel is driven was supplied by Messrs. Richardsons, Westgarth & Co., of Middlesbrough, under joint licence from Messrs. Carels Frères, of Ghent, and the Diesel Engine Co., London. These two latter firms recently amalgamated in the formation of the Consolidated Diesel Engine Manufacturers, Ltd. The *Eavestone* will in due course come to London, where no doubt those interested will have the opportunity of inspecting the Diesel marine engine by which the vessel is propelled. Messrs. Cochran and Co., Annan, Ltd., have supplied two Cochran donkey boilers, each fitted with patent seamless furnace. For Launch see July issue.

Saba.—On August 14th, the new screw steamer *Saba*, built by Messrs. John Readhead & Sons, Ltd., West Docks, South Shields, to the order of Messrs. Scrutton, Sons & Co., London, was taken to sea on her official trial trip. After the trial, which was in every way satisfactory to all concerned, the vessel proceeded on her voyage. She has been built under the superintendence of Mr. H. Barringer, of Messrs. Jacobs and Barringer, London, and Captain Norris, and is the tenth vessel built for the above firm by Messrs. John Readhead and Sons, Ltd. For Launch, see July issue.

BOARD OF TRADE EXAMINATIONS.

JUNE 20th.—LONDON.—*1st Class:* R. Bigmore, A. Monk. *2nd Class:* J. Barclay, A. Campbell, F. Gillam, J. Harding.

CARDIFF.—*1st Class:* I. Brimer, S. Davies, E. Farminer, F. Greggans, H. Jenkins, O. Luft, D. Ryan, H. Sadler, F. Sladen. *2nd Class:* N. Bastian, J. Cavanagh, A. George, A. McQuade, I. Morgan.

NORTH SHIELDS.—*1st Class:* H. Drew, J. Halliday, G. Humble, J. Hyde, F. Jackson, M. Mail, P. Sanderson, J. Stoddart, W. Taylor. *2nd Class:* W. Bowles, T. Brown, R. Smith, J. Wraith.

LEITH.—*1st Class:* J. Rennie, J. Stephen, A. Tawse, R. Wilson.

LIVERPOOL.—*1st Class:* F. Dainty, J. Douglas, A. Forbes, J. Nicoll, E. Varian. *2nd Class:* A. Deuchars, W. Dunsmore, J. Patterson, J. Wilson.

GLASGOW.—*1st Class:* J. Creach, J. Ferguson, J. Gray, D. McCombie, J. Macleod, T. Malcolm, P. Ormond, J. Rodgers, D. Taylor, *2nd Class:* J. Macdiarmid, P. McEvoy, H. McKie, E. Ronget, J. Spence.

BARROW.—*2nd Class:* M. Cooper, F. Crosbie.

WEST HARTLEPOOL.—*1st Class:* F. Tomlinson. *2nd Class:* R. Lamb, C. Naisbitt, S. Robinson, J. Ward, A. Wilson

SOUTHAMPTON.—*1st Class:* G. Manning. *2nd Class:* J. McInnes.

PLYMOUTH.—*1st Class:* R. Clemens, R. Flower. *2nd Class:* F. Andrews.

JUNE 27th.—LONDON.—*1st Class:* J. Muirhead, M. Robson. *2nd Class:* I. Jones.

LONDONDERRY.—*1st Class:* T. Carrey, F. Pearson.

BRISTOL.—*1st Class:* R. Nettell. *2nd Class:* C. Scourfield.

SUNDERLAND.—*1st Class:* F. Bodin, J. Chevers, W. Fowler, J. Lumsden, F. Howison, R. Rawlings, D. Robinson, W. Sheel. *2nd Class:* W. Bews, E. Blakeburn, J. Hays, J. Turnbull.

HULL.—*1st Class:* D. Carson. *2nd Class:* J. Carruthers, W. Gillmore, H. Ritzinger, H. Watson, F. West.

LIVERPOOL. *1st Class:* T. Burch, A. Ellis, A. Houston, B. Wood. *2nd Class:* H. Fothergill, F. Hooton, H. Willan.

ABERDEEN.—*1st Class:* T. Riach, J. Sutherland. *2nd Class:* H. Martin.

NORTH SHIELDS.—*1st Class:* J. Bruce, A. Johnson, A. Mallaby, W. Manson, W. Thompson. *2nd Class:* E. Evans, J. Gray, W. Johnston, F. Zealand.

GREENOCK.—*1st Class:* A. Avid, R. Beaton, T. Gallie. *2nd Class:* R. Cuthbertson, A. Fleming, T. MacGibbon, J. Rankin.

JULY 4th.—LONDON.—*1st Class:* F. Forster, E. Macleod, L. Nowland, A. Wright. *2nd Class:* J. Imrie, C. Nicholson, B. Tharp.

GLASGOW.—*1st Class:* J. Findlay, H. McColl, J. Malcolm, F. Scott. *2nd Class:* H. Anderson, W. Dobie, J. Geddes, J. McQuarrie, K. Ross, J. Smillie, W. Sutherland.

LIVERPOOL.—*1st Class:* J. Gilbert, T. Noel, D. Prophet, S. Sampson, T. Sargent, R. Thirkell, A. White. *2nd Class:* R. Bell.

BELFAST.—*2nd Class:* C. Hay, G. Legate.

SOUTHAMPTON.—*2nd Class:* A. Smith.

LEITH.—*1st Class:* A. Bower.

CARDIFF.—*1st Class:* J. Davidson, W. Frederick, C. Wakeford. *2nd Class:* L. Wright.

JULY 11th.—LONDON.—*1st Class:* W. Caws, W. Thompson. *2nd Class:* J. Wilson.

DUNDEE.—*1st Class:* R. Glass, H. Lawson.

NORTH SHIELDS.—*1st Class:* H. Brough, A. Burlinson, H. Cummins, W. Devonport, E. Heads, G. Storey. *2nd Class:* W. Colbeck, B. Hodgson, J. Hollingsworth, W. Spiers, H. Young.

LIVERPOOL.—*1st Class:* R. Quarrie, W. Woods. *2nd Class:* J. Barr, R. Evans.

HULL.—*1st Class:* R. Hall, C. Mawer, J. Peterson. *2nd Class:* W. Paulson.

GREENOCK.—*1st Class:* A. Nicol, R. Robinson. *2nd Class:* J. Carlton, D. Rolland, J. Simpson, L. Symes, J. Wilson.

JULY 18th.—LONDON.—*1st Class:* R. Helyer, B. Kverndal, J. Walsh. *2nd Class:* W. Allan, D. Dick, M. Macaulay, H. Osborne.

CARDIFF.—*1st Class:* A. Glen, J. Lloyd. *2nd Class:* E. Gray, A. Thomas.

GLASGOW.—*1st Class:* G. Brown, W. Graham, E. Hutchison, J. Mitchell, J. Robertson, G. Spence, R. Thomson, J. Walker. *2nd Class:* J. Archibald, J. McDonald, J. McLay, H. Richmond.

WEST HARTLEPOOL.—*1st Class:* E. Atkinson, T. Dixon. *2nd Class:* J. Croft, M. Davison.

LIVERPOOL.—*1st Class:* W. Hughes, S. Shingler. *2nd Class:* D. Burnell, E. Fleming, J. Glynn, W. McIntyre, G. Robertson, W. Rowbottom, O. Short, R. Wittle.

PLYMOUTH.—*2nd Class:* E. Bourne.

SOUTHAMPTON.—*1st Class:* J. Brown, H. Payn. *2nd Class:* D. Macfarlane.

LEITH.—*1st Class:* C. Martin. *2nd Class:* A. Duncan, M. Marshall, G. Whitson.

NORTH SHIELDS.—*1st Class:* F. Appleby, G. Barlow, A. Johnson, L. Maller, R. Morley. *2nd Class:* W. Burnside, A. Dotchin, E. Flint.

JULY 25th, 1912.—LONDON.—*1st Class:* A. Martin, H. Waterworth. *2nd Class:* L. Gunn, E. Robinson.

HULL.—*2nd Class:* F. Smith.

BRISTOL.—*1st Class:* F. Jones.

GREENOCK.—*1st Class:* S. Gazdar. *2nd Class:* A. McDonald.

The Board of Trade—*Continued*

ABERDEEN.—*1st Class*: H. Lyle, R. Pittendrigh.
SUNDERLAND.—*1st Class*: G. Brown, W. Nairn. *2nd Class*: L. Gordon, W. Owsnett, H. Thomas.
PLYMOUTH.—*Ex. 1st Class*: J. Bunmore.
BELFAST.—*Ex. 1st Class*: T. Wright. *2nd Class*: J. Holmes.
LIVERPOOL.—*2nd Class*: H. Anstwick, W. Booth, J. Hughes, C. McIvilie, T. Wright.
NORTH SHIELDS.—*Ex. 1st Class*: G. Pattullo, G. Sims. *1st Class*: V. Burdon, F. Grose, N. Livesey, W. Mills, D. Nicholson, L. Reay, V. Stienlet. *2nd Class*: P. Cooney, W. Gold, J. Munro, A. Taylor, F. White.
WEST HARTLEPOOL.—*Ex. 1st Class*: H. Walker.
LEITH.—*Ex. 1st Class*: E. Mann.

AUGUST 1st, 1912.—LONDON.—*Ex. 1st Class*: J. G. Freeman. *2nd Class*: F. Coward, H. Garnett, W. Maclean.

GLASGOW.—*Ex. 1st Class*: D. Rose. *1st Class*: J. Bentley, C. Lewis, W. Murray. *2nd Class*: J. Stocks.
CARDIFF.—*1st Class*: H. Bement, S. Darling, A. Mackenzie, G. Oliver, E. Stenner, W. Watts. *2nd Class*: J. Fielding, J. Lewis, F. Pizzarello.
LEITH.—*1st Class*: M. Abernethy, G. Craigen, T. Storrie. *2nd Class*: F. Bell, J. Crooks, G. McKay, J. Spark.
LIVERPOOL.—*1st Class*: J. Bale, L. Brew, L. Hartje. *2nd Class*: J. Cubbin, F. Dykes, M. Hartnett, J. Hellon, A. Hill, J. Jones, O. Nicholls, J. Robertson.
NORTH SHIELDS.—*1st Class*: T. Anderson, A. Atkinson, S. Bateman, C. Dunning, G. Hunter, J. Peacock. *2nd Class*: R. Dry, C. Jordan, H. Share, J. Shield, G. Wilson.
SOUTHAMPTON.—*1st Class*: R. Campbell, J. Crichton. *2nd Class*: P. O. Derham.

AUGUST 8th, 1912.—LONDON. *1st Class*: C. Hulett, W. Rance. *2nd Class*: W. Dunn.

LIVERPOOL. *1st Class*: J. Barwise, F. Knuppel, J. Paterson. *2nd Class*: E. Cooke, J. Hilken.
GLASGOW.—*1st Class*: T. Barr, G. Johnstone, P. McKillop, J. Porteous. *2nd Class*: D. Macdonald, T. Mackay, J. Ramsay.
NORTH SHIELDS.—*1st Class*: W. Brown, R. Butchart, J. Green, D. Renton, W. Stevenson. *2nd Class*: E. Baty, R. Coomber, J. Cracknell, T. Fair, J. Mole, E. Pattison, W. Pigg, H. Rutherford, J. Stephenson, R. Young.

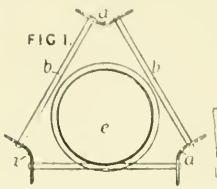
AUGUST 15th, 1912.—LONDON.—*2nd Class*: J. Hockaday, J. Inglis, J. Robertson.

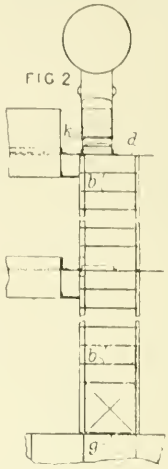
GREENOCK.—*1st Class*: W. Cove, D. Graham, W. Mathieson, J. Taylor. *2nd Class*: J. Brewster, A. Howat, A. McArthur, D. McLennan, J. Martin, R. Ramsay, A. Stirrat.
LIVERPOOL.—*1st Class*: A. Clarke, E. Edwards, M. Fearn, C. Harris, P. Howard. *2nd Class*: A. Bacon, M. Downing.
HULL.—*1st Class*: J. Fathers, R. Huby. *2nd Class*: S. Pederson, C. Thompson, A. Wagg.
DUNDEE.—*1st Class*: W. Birrell, J. Brown. *2nd Class*: D. Archer, J. Kidd.
NORTH SHIELDS.—*1st Class*: T. Prior, J. Small, J. Wood. *2nd Class*: J. Abbie, J. Cookson, J. Crammond, W. Ferguson, J. Muir, G. Robins, G. Sharp, W. Stone.

The Marine Engineer and Naval Architect Patent Record.

Compiled by Messrs. E. P. Alexander & Son, Chartered Patent Agents, 306, High Holborn, London, W.C.

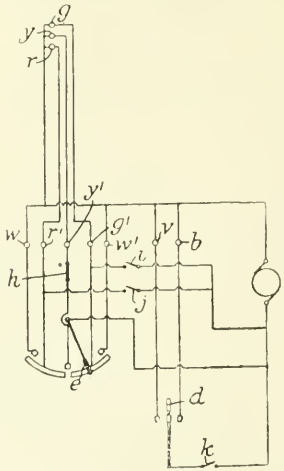
9230. Ships: Stanchions. Means are provided for communicating with or obtaining access to the holds of ships, comprising an open-work structure formed of stanchions or pillars *a* of angle-bars, between which are situated rungs *b*. The ladder-way so formed is situated near the hatchways *e*, and extends through the decks *d*, *e1* to the tank top *g*. Rungs are omitted at the lower ends to form openings *i*. The upper ends are provided with an entrance way *k* which may be fitted with a ventilating cowl. Modifications in the form of





the stanchions are described in which the stanchions are made wider than those shown, or are formed of tongue-shaped members the full width of the ladder.

9428. Ships' Signals. In an electric signalling system for indicating the position of the rudder and controlling gear in ships, the rudder *e* puts in circuit the coloured lamps *g*, *y*, *r* on the mast head and the lamps *g1*, *y1*, *r1* in the wheel house to indicate its position. The extreme positions of the rudder are indicated by white lamps *w*, *w1* in the wheel house.



Hand switches *h*, *i*, *j* are provided to signal a proposed change of direction. The lamps *b*, *v* indicate the position of the reversing lever *d*, or the weight-shaft. If the engines stop, the circuit of the lamps *b*, *v* is broken by the switch *k*, which is actuated automatically, as by a governor.

The Marine Engineer

And Naval Architect.

LONDON, OCTOBER, 1912.

THE ECONOMY OF MARINE STEAM ENGINES.

IN the present day, when the steam engine which has served the shipowner so well in the past is being assailed by oil and gas internal combustion engines, the necessity of ascertaining as closely as possible the practical extent of economic working conditions becomes more and more necessary. This aspect is more important to those who own ships which have a considerable length of life in front of them, than to those who are anxious and willing to make excursions into new ground, on an experimental basis, to get the best that science and art can produce, from the point of view of earning capacity in relation to capital sunk. For any direction or suggestions those who are anxious to obtain the best possible results from their present steam plants may usefully study a paper written by Lieutenant F. W. Milner, of the United States Navy, and contributed to the American Society of Naval Engineers. After pointing out the experiments which have been carried out by such investigators as Isherwood, Willans, Thurston, Gately and Kletzsch, Emery and Loring, and many others, in which the general law of the effect of each element had been enunciated, he indicates that the results were sufficiently uniform to show that the earlier the cut-off the greater is the economy, condensation is a function of the number of revolutions and increases as the power is reduced; jackets in some cases are of use and in others are a source of loss; throttling is generally a source of loss; with a decrease of power the water rate of an engine increases, and lastly, the cut-offs or number of expansions have an important effect on the economical development of power. However, it will be recognised that these factors only indicate the direction in which economical construction and operation can be effected, and the operating engineer is met with the difficulty of ascertaining precisely the best conditions under which his particular engine will give the most efficient result. Although a considerable amount of data has been collected, it has been with reference to stationary engines, under which the conditions of test are fairly easy in view of the ease of varying the factors to be dealt with. It is no doubt on this account that the number of exhaustive tests on marine engines has been so few, and the data obtained on stationary engines are not applicable, not only on account of the difference of conditions, but also owing to difference of type of engine. The limitations in the case of the marine engine are the small space available, the conditions of user having regard to the service of the vessel, and the impossibility of varying the horse-power by varying the number of revolutions per minute. The author has set out concisely some of the experimental results obtained in the British and United States Navies, and the deductions to be drawn therefrom. Among these may be mentioned the following:—That the position of the L.P. cut-off has a marked effect upon the economy of operation of an engine, and that the later the cut-off the greater the water rate per I.H.P., and that with certain engines running at a certain piston speed, and under a certain initial pressure, there is a certain number of expansions which produce a maximum economy, and that a number of expansions greater or less than this will increase the water rate. The experiments showed that the efficiency of an engine varies considerably with the conditions of its use, and further, the efficiencies of different engines vary with the type of engine, dimensions of cylinder, thickness of metal, back pressure, neutral pressure, piston speed, expansion of steam jacketing, valve gear, etc., so that any deductions from one set of conditions with a given engine may not apply to other conditions for the same engine and still less with other engines, so that each case presents a separate and distinct problem which requires a distinct solution. It will thus be seen that the only sound deductions which can be made to determine the economy of the engines of a particular kind are those based on the actual factors obtained under conditions of test, and to this end the author outlines a scheme which he considers sufficiently accurate for the purpose. He states that the number of experiments are not large nor is the time involved very long. The scheme involves the provision of calibrating feed tanks, arrangements by which the only steam entering the condenser of the engine to be tested is that from the engine and from its jackets, the adjustment of the cut-offs of each cylinder so as to properly distribute the work, the carrying out four trials without throttling and without the use of the jackets, two trials with the jackets and two trials with maximum throttling. When these have been completed, the results must be plotted and the effect of the steam to the receiver and of the auxiliaries. In carrying out the actual trials four points of cut-off are taken, extending over the entire range of expansive working. In dealing with the pressures, previous experience obtained when arriving at the data concerning the relative setting of the independent links would indicate the pressure needed in the H.P. valve chest at each setting. When these are settled about 25 lbs. more pressure should be kept on the steam pipes, throttling it at the throttle valve to get the required valve chest pressures. This is done to ensure a steady rate of revolution and to allow for increased power for a short time in case of emergency. The cut-offs and the H.P. valve chest and boiler pressure being known the tests are begun. The tests are

made with the four points of cut-off and with four different boiler pressures, the steam jackets being cut out. The feed tank is drained to its lowest graduation and the test is run off, the revolutions being kept as constant as possible. When the water in the tank has reached a safe height, the time and height are noted and the contents drained into a reserve feed tank. In dealing with the effects of the jackets the tests are repeated with the earliest and latest cut-offs, using the steam on the jackets and recording the results as before.' To find out the effect of the pressures the same two tests are repeated, using full boiler pressure in each case and throttling down at the engine. These eight experiments should furnish sufficient data to determine the best cut-off, pressure and the best use of jackets. This can be readily shown by plotting a curve with the expansions and cut-off as abscissæ and the water consumption per revolution as ordinates, so as to give an expansion-water-rate curve. This curve will show at a glance what is the most economical number of expansions corresponding to a particular cut-off in the H.P. cylinder, the number of expansions when the use of the jackets causes a loss and the number when their use results in material gain. It is obvious that no live or exhaust steam should be admitted to the receivers during the tests. The consideration of the suggested method is one which is deserving the attention of any chief engineer who is desirous of arriving at some reliable data as to the performance of the engines in his charge, and the simple alteration and additional plant involved should lead ship-owners to give facilities to their servants to enable them to supply them with information which may be of material financial benefit to them in the long run in determining the possible earning capacities of their ships.

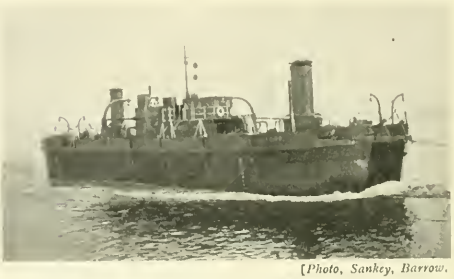
H.M.S. "AUDACIOUS."

H.M.S. *Audacious* was launched on September 14th from the Tranmere yard of Messrs. Cammell, Laird & Co., Ltd. The launching ceremony was performed by Countess Lytton, who was accompanied by Lord Lytton. Large stands for spectators had been erected, and a most successful launch took place before a great number of people. A general holiday was observed in the yard. It may be remarked that the first *Audacious*, a wooden frigate of 1,624 tons, was built in the reign of George III.; the second was an iron-cased vessel, built in 1869. The present vessel is the last of four battleships laid down under the 1910-11 programme, the others being the *George V.* (Portsmouth), *Centurion* (Devonport), and *Ajax* (Scott's). The vessels are 555 ft. B.P. and 89 ft. beam, with a load draught of 27 ft. 6 in., displacing over 23,000 tons. Parsons' turbines give a speed of at least 21 knots, with a S.H.P. of 31,000. The armament consists of ten 13·5 guns in five twin turrets of centre line of ship, also sixteen 4-in. guns.

"TITANIC" ENGINEERING STAFF MEMORIAL.

THE amounts collected at the three centres for the above fund are stated by the Committees to be as follows :—

Institute of Marine Engineers, London, up to 25th September	£2,020	0	0
Southampton Committee (for the erection of a monument in Southampton) up to 25th September	1,020	0	0
Liverpool Committee (for the erection of a monument in Liverpool) up to 25th September	4,000	0	0
	£7,040	0	0



[*Photo, Sankey, Barrow.*

Submarine Salvage Boat, built by Messrs. Vickers, Ltd., for the British Admiralty.

DIESEL ELECTRIC GENERATING PLANTS

ONE of the important matters to which the unfortunate *Titanic* disaster has drawn attention is the maintenance of the electric lighting current after the main engines and boilers have been placed *hors de combat*. In this particular case the light was maintained for a long time after the collision, but it will be obvious that in the average seagoing ship such a fortunate state of affairs is extremely unlikely, and the strong probability is that the danger would be increased by the vessel being suddenly plunged into darkness through stoppage of the lighting plant when dependent upon steam as its motive power. The Diesel Engine Company, Ltd., of General Buildings, Aldwych, London, W.C., have put upon the market a self-contained Diesel engine generating plant adapted to be driven by an inexpensive residual petroleum, having a flash point of 230 deg. Fahr., so that the unit can be stationed anywhere in the ship without risk from the fuel, particularly as the fuel is contained in a tank close to the engine. With such an installation on board, no steam engines need be used under steam in port for lighting and power purposes.

The First Turbine Destroyer Built in Italy.—The trials of the destroyer *Indomito*, built by the "Societa Officine e Cantieri Napoletani C. & T. T. Pattison," of Naples, were recently held. This vessel is the first of the six destroyers with Tosi turbines being built by the firm for the Ministry of Marine. The *Indomito* destroyer has a displacement of 680 metric tons and is 73 metres long, 7·32 wide, and 4·82 deep. She carries four tubular boilers, two Tosi turbine engines, constructed by Messrs. Franco Tosi, of Legnano, and each driving one of the two propellers. The two turbines, of 15,000 H.P., estimated, gave during a three hours' trial a speed of 35·09 knots, much greater than that specified in the contract, thus the *Indomito* is the swiftest craft in the Italian Navy. The excellent results obtained both from the point of view of working and consumption, in spite of the somewhat limited weight and dimensions of the turbines, as required in torpedo-boats, are the more remarkable, because these turbines were invented and made in Italy and have numerous novel features.

THE FLEETS OF THE MAIL LINES.

(*From our Own Correspondent.*)

Big Steamships.

In connection with the much vexed question of life-saving appliances aboard ship, the Board of Trade has issued an interesting list of British vessels to which passenger certificates were issued as in April, 1912. As regards vessels of 10,000 tons and upwards, the list practically, if not absolutely, includes all vessels of this size on the British register at the date named, and altogether comprises some eighty-two vessels. It may be interesting to notice how the figures for size stand. There are

of	10,000	to	11,000	some	31 vessels.
,,	11,000	,,	12,000	,,	16 ,,
,,	12,000	,,	13,000	,,	20 ,,
,,	13,000	,,	14,000	,,	6 ,,
,,	14,000	,,	15,000	,,	7 ,,
,,	15,000	,,	16,000	,,	1 ,,
,,	16,000	,,	17,000	,,	— ,,
,,	17,000	,,	18,000	,,	1 ,,
,,	18,000	,,	19,000	,,	2 ,,
,,	19,000	,,	20,000	,,	2 ,,
,,	20,000	,,	21,000	,,	1 ,,
,,	21,000	,,	22,000	,,	— ,,
,,	22,000	,,	23,000	,,	— ,,
,,	23,000	,,	24,000	,,	1 ,,
,,	24,000	,,	25,000	,,	1 ,,

Above this limit we have the *Lusitania* and *Mauretania* and the *Olympic*. All the nineteen steamships of 14,000 tons and upwards are engaged in the North Atlantic trade.

But of the six vessels between 13,000 and 14,000 tons, though four are in that trade, there are two Union-Castle Mail steamships. Taking the next lot, those of 12,000 to 13,000 tons, we find them more generally distributed over the great companies. Cunard has one, engaged in the North Atlantic trade; so has the Allan line. The Royal Mail also has one employed on the South Atlantic. But Orient has six and P. & O. two in the Australian Mail service; whilst the Union-Castle has four, and the White Star five, these latter being in their Australian and New Zealand lines. We notice that the Royal Mail Company's *Araguaya* of 10,537 tons has as many as thirty boats to her credit in the table. These are calculated to carry 1,633 persons, whilst her total complement of passengers and crew is 1,616 persons. The White Star liner *Arabic* of 15,801 tons and the Royal Mail *Asturias* of 12,002 tons come next with twenty-eight boats each, and then the Allan liner *Tunisian* with twenty-seven boats. But of course number is not everything, for the Cunard liner *Ultonia* can carry 1,074 people in her eighteen boats as against 1,064 in the *Tunisian's* twenty-seven boats.

Make-Shift Oil Carriers.

The difficulty of coping with the demand for tank steamers to carry to Europe the huge quantities of oil which modern requirements demand, is causing shipowners to endeavour to cope with the situation by fitting vessels of the ordinary type with cylinders in which oil can be conveyed. The first vessel to be so dealt with is a four-thousand-ton Norwegian steamship, the *Borgestad*. This vessel was built at Middlesbrough by Sir Raylton Dixon & Co. in 1906, being one of the first constructed on the cantilever system. She is now at New York being fitted for the carriage of oil. Twenty-five separate tanks are being put into her, the largest of which are of upwards of 20 ft. in diameter and capable of containing nearly five hundred tons of oil. The smaller tanks are of about 12 ft. diameter. They are all shored and wedged into their positions. The usual installation of pipes for filling and emptying the tanks is provided, and, to avoid the possibility of any trouble should the vessel in heavy weather cause any of the tanks to move sufficiently to break the joints of the pipes, the tanks are further fitted with internal valves to prevent the possible escape of oil. The *Borgestad*, though the first vessel to be prepared in this way, has several fellows in the undertaking, which, it is hoped, will enable other vessels than tankers to participate in the high freights which oil ships now command.

The P. & O. Company

is making very notable additions to its fleet. It is not a twelve month since the two principal M's—the *Medina*, which served as the King's yacht on his notable and historic voyage to India, and her sister the *Maloja*—were added to the active list, and already another of the class has been ordered from Messrs. Caird & Co. This vessel is described as an improved "Mooltan" and is intended chiefly for the Bombay service, as distinguished from that to Australia. But she is not to be an "M" in name. For she is to be known as the *Kaisar-I-Hind*. She will, of course, be the second of that name, which is revived at an appropriate moment. The original vessel was also built by Messrs. Caird's and was launched in the year 1878, being the crack ship of the day, her name commemorating the assumption by Queen Victoria of the title of Empress of India. But what a difference between the old and the new vessels! That of 1878 was but a single-screw of 4,008 tons gross register, and was fitted with compound engines. The new ship will be of 525 ft. in length, of upwards of 11,000 tons and will have luxurious accommodation for passengers, of a kind quite undreamt of thirty-four years ago. She will have many single-berth state-rooms and in no case will more than two passengers be berthed in a single room. It would take too long to enumerate all the appliances for safety and comfort which the new ship will contain which were unknown when the first *Kaisar-I-Hind* put to sea. Then there are four vessels of the "Nile" class under construction. Two of these have been launched. They are the *Nankin* and the *Novara*, vessels of about 7,000 tons and fitted with twin screws. Two sisters, the *Nagoya* and the *Nellora*, are about ready for launching, and now four more vessels are ordered. These are of a new class, and are intended for the trade to the east coast of India. They will be of 9,000 tons gross register and are to be built as to one pair by Messrs. Caird and as to the other by Messrs. Cammell, Laird & Co., of Birkenhead. It is stated in the press that the P. & O., have made a new departure in going to Birkenhead for their new steamers, but there are records of more than one vessel from that same yard which has served in the P. & O. fleet. But it is not certain that any of those referred to were built for the Company in the first instance.

The Disadvantage of the Paddle,

as opposed to the screw, was again shown by the experience of the Belgian State Railway Co.'s steamship *Leopold II.*, which left Ostend for Dover in the ordinary course on the 13th September. When she had got some twelve miles on her voyage she broke down and had to put back. Her passengers were then transferred to the Company's steamer *Rapide* and again sent forward, arriving of course, many hours late. Had the *Leopold II.* been fitted with twin screws or turbines the probability is that she would have been able to make her destination, though possibly at somewhat reduced speed, and thus would have saved her passengers much annoyance and discomfort. The Belgian State Railway has, of course, three very fine turbine steamships on its service, and there are two more of the type under construction, so that we may hope that within a comparatively short time the last of the paddlers may be discarded from the fleet. The *Leopold II.*, by the way, is by no means an old ship, having been built as recently as the year 1892. Speaking of

Dover,

it is interesting to observe that the Admiralty seems to have made up its mind to close the western entrance to the harbour there. There have always been complaints as to the dangerous condition of things when a heavy tide comes up channel, and when a gale is blowing from the westward—the seas coming into the harbour with considerable violence and dangerous cross currents and ground swells being induced. Further, it now appears that a good deal of silt comes in through this opening whereby the expense of dredging is rendered heavy and the need for work continuous. The closing of the entrance will, it is hoped, do away with much of the need for dredging the harbour and better access will, it is expected, be attainable by making a new opening, possibly two, on the eastern side of the harbour.

Rumours of Amalgamation

are much in the air, and prices on the Stock Exchange seem to lend some ground for the belief that something is in the wind, though official denials continue. One suggestion has

been as a wedge between Cunard and the P. & O. Company. This seems to have arisen from the fact that the great Liverpool line has been appointed agent to the Leadenhall Street Company, and that thus through bookings between any places served by either organization will henceforth be possible. Though this innovation will undoubtedly be useful to the travelling public and of advantage to those who have instituted it, it can hardly be supposed that it in any way involves amalgamation. Many companies have for years acted as agents for one another without any suggestion of any union between them.

The White Star Line.

Persistent rumours have been flying about to the effect that Mr Bruce Ismay, the president of the International Mercantile Marine Company, and Mr. Harold Sanderson, his chief lieutenant on this side of the Atlantic, contemplate retiring from their respective positions. That Mr. Sanderson should have such an intention is doubtful, but Mr. Ismay is a man of great private wealth, even by the standard of modern fortunes, and of late he has found his position one of considerable anxiety. Indeed, his answer to an enquiry as to the truth of the rumours leaves it quite on the cards that he may be thinking of giving up the reins.

The *Olympic* has been unfortunate in a very minor kind of way. Outward bound in the early part of August she dropped a blade from her starboard propeller. This is a thing which in a smaller vessel would hardly be reported. But thanks to her size, and to the fact that the Belfast dry dock is practically the only one open to her at present, the fitting of a new blade is a serious business, and a great effort had to be made to minimize the consequent inconvenience. Arriving at Plymouth on the morning of the 24th August, having made a speed of 19½ knots on the voyage, she landed all her passengers, who were sent on to their English destinations by rail, whilst those who were booked for Cherbourg were sent across the Channel by Great Western special steamer. The liner herself was sent off to Belfast, where she was promptly docked, and the new blade fitted. By the Wednesday she was at Southampton and on the Thursday—just a day late, she started on her usual voyage to New York. Though the weather was most unfavourable—pouring wet the whole time—an amount of no less than 4,000 tons of coal was got into her bunkers in 14½ hours. This is said to constitute a record for coaling. But her troubles were not to end, for as she came east again, on Friday, the 13th September, she again lost a blade, this time from her port propeller. On her arrival at Plymouth next day it was announced that this incident was not to disarrange her fixed programme. She would make the round voyage commencing the 18th September at reduced speed as she is and on her return to England early in October she will go to Belfast again. But she will be off the station for some time, as a good deal more than the replacement of a blade is contemplated. (See Belfast notes.)

The Prince Line

seem to be largely modernizing their fleet with new ships and with purchases. One of the latest acquisitions is the *Mineola*, a fine vessel of between 4,000 and 5,000 tons, which they have bought from Messrs. T. Hogan & Sons, of Bristol. She was built at Sunderland in 1900 by Messrs. James Laing and Sons, and in 1907 was chartered by a New York millionaire for a round-the-world yachting tour, the performance of which contract involved a complete and most luxurious rearrangement of her accommodation.

The Nord Deutscher Lloyd.

From a recently issued pamphlet it appears that this Company—which in magnitude is second only to the Hamburg-American Line—owns altogether some 115 steamships of the ocean-going type. Of these no less than fifty-two are fitted with twin-screws—a thing which indicates their recent construction, for it may not be forgotten that the Company, in other respects progressive enough, was one of the last to give its confidence to the double-screw principle. In addition to these vessels it has forty-three river steamers of a combined tonnage of 6,275 tons, two school ships of a combined tonnage of 5,853 tons, and thirty steam sloops and lighters of a combined tonnage of 3,371 tons. Under construction there are no less than 85,500 tons of steam shipping, including the great Atlantic passenger liner *Columbus*, whose capacity is now put at 35,000 tons; three cargo vessels of 6,500 tons each, for the Australian trade, being sisters to the new vessel *Rheinland*, recently added to that branch of the fleet, and four steamships of a new "Sierra" type for the development of the passenger trade to South American ports. These latter vessels will be not far short of seven thousand tons gross register apiece.

One of the vessels which was prominently before the public in connection with

The Titanic Disaster

has herself already succumbed to the ice peril. This is the composite screw schooner *Algerine*, owned by Messrs. Bowring's, of St. John's, Newfoundland. She is reported to have been cut through and sunk by ice as long ago as the middle of July, though the news of the accident has only just reached England, as the crew—who in these sealing steamers is always a very large one—had been picked up by another vessel, the *Neptune*, similarly employed, and the rescuer had not thought it desirable to lose her chance of her catch by proceeding to port with her involuntary passengers. It may be remembered that after the cable steamers had had to return to their repair work and desist from the melancholy duty of searching for bodies from the *Titanic*, the managers of the White Star Line chartered the *Algerine* to make a last effort for the recovery of any that might still be afloat.

The Dangers of Floating Mines

to neutral shipping have once again been exemplified by the experience of the Liverpool steamship *Barrowmore*, which was struck by a derelict contrivance of this nature off the port of Salonica, sustaining such damage to her fore hold as to necessitate her being beached. It is said that the wound caused by the explosion was no less than sixteen feet square. If this be so, the vessel was fortunate indeed to have escaped foundering in deep water. It now remains to be seen whether or no one of the belligerents was at fault in letting the mine get into the position where it did so much mischief, and, if so, whether the shipowners and underwriters will make a claim on those in default. But after the disgraceful want of energy shown by the British Foreign Office in regard to first the *Oldhamia* affair and later in the matter of the Hoult liner, which was seized by the Roumanian Government, it is not very likely that any redress will be obtained.

HARDWARE AND IRONMONGERY EXHIBITION.

THE title given to this exhibition, held at Olympia, does not appeal to engineers, but there were several exhibits of considerable interest from even their point of view, and we observed among the visitors, between the 7th and 17th September, at Olympia many marine engineers who had discovered that something might be learned of advantage to them in their business, by object lessons bearing upon the progressive advancement and expansion of technical science and practice. The true engineer is ever on the look out for such with the wholesome desire of adding economy to economy in whatever industry he may happen to be engaged, whether ashore or afloat. Many shipowners recognise this trait in their engineers and accept it as a matter of course.

Among the exhibits lent by the Institute of Metals and the Iron and Steel Institutes were relics and samples of great interest—test bars with various percentages of carbon, phosphorus, manganese, silicon, sulphur and the first steel rail rolled at Crewe Works in 1863; bar of Roman iron forged nearly 2000 years ago; specimens of ores from Canada, corroded and wasted metal samples, defective castings, each and all fraught with serviceable lessons to the studious visitor. Among the general exhibits which claimed attention, and had their claims allowed, were those of the "Fastnut," Limited (spanners, etc.), "Mendit," Limited (cements for various materials); "Ozonair," Limited (ventilation and air-sweetening apparatus); Messrs. Ferguson & Timpson (grinding and sharpening sets). The grinders are composed of a substance termed "Dimo-grit," and are mounted on neat stands with provision for driving by hand, foot or motor. With these on the market at the prices quoted, the "Newcastle grindstone" has lost its place where tools are used, as the *sine qua non*. Various kinds of lights were exhibited—acetylene, petrol and other products as the illuminating agent; oil fuels—liquid and solid—the latter in

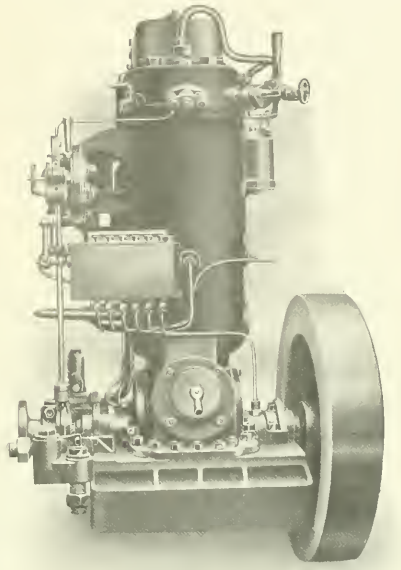
great variety, mixed with other combustibles to suit different purposes; deck-chairs, one style having among other advantages that of being a life-saving appliance, due to its flotation capacity; "Coal-save," a powder which, added to coal mingles with the products of combustion, and turns them into heat—thus perfecting the operation, gives a saving of coal and eliminates smoke and soot; Kaye's oil cans, fillers, pumps, economisers for oil and other engine-room articles of outfit were on view on their merits. There were several details for domestic use which might fittingly be applied to steamships in the steward's department

OIL ENGINE EXHIBITION.

In the special section of the exhibition devoted to oil motors were several Blackstone-Engines, special note being attached to the Blackstone Carter type for crude oil, where the compression required is only 150 lbs., thus avoiding the severe strains on the crank and the consequent tear and wear due to very high compression. Messrs. Beardmore & Co., Ltd., had a type of engine on view which is illustrated and described elsewhere. The Anglo-Saxon Petroleum Co. was represented by a model of the oil motor ship Vulcanus, which has now been running for some time. The India-rubber and Gutta Percha Co., Silvertown, had sets of electric plant coupled to oil motors, and details of their special manufacture. Drilling machinery and appliances, also samples of various oils were exhibits of considerable help to a general understanding of the ways and means of the oil producing industry, and greatly aided those who attended the lectures given during the course of the exhibition on this subject. One lecture by Mr. C. Lakin-Smith on "Oil engines for marine and land purposes," dealt with a few points which, had circumstances admitted, might have been profitably discussed by some marine engineers who were present; it would doubtless have been pointed out to the author that marine engineers have always desired, in their criticisms of the internal combustion engine, to find out its bad as well as its good properties, not with the object of condemning it, but to gain evidence from experience. The criticism offered in discussion has a good intention and, as a rule, a good result. It seeks to discover defects and seeks for remedies. The comparative figures quoted from a paper by Mr. Chas. Day, from Central Station Work, showed a great saving in the cost of fuel in pence per h.p. as follows:—Steam ·45, gas ·43, oil ·23. Comparative tests given from other sources confirmed these, to the greater advantage of oil. The main types of oil engines were briefly described and the adoption of the most suitable for marine propulsion was stated to be a question which was well in evidence in many quarters. Comparison of weights were quoted to show that not only is there a saving in fuel consumed by the oil motor over steam, but a saving in space and weight. Thus, for a 250 h.p. engine the weights were given:—Diesel 21 tons, steam 33 tons; while for a Bolinders' engine of 100 b.h.p., the weight was 10½ tons, and a steam engine and boiler for the same h.p. 20 tons (including fuel in each case). A closing reference was made to oil engines for the Navy, and the appointment of the Royal Commission for an enquiry into the subject. The other papers and lectures were interesting from the historical and descriptive view of oils, their sources and their services.

BEARDMORE OIL ENGINE $7\frac{1}{2}'' \times 9''$.

THE accompanying illustration shows the Beardmore engine exhibited at Olympia, and which, at 450 revs., develops 15 B.H.P. It is adapted for using residuum oil or paraffin, as circumstances may dictate. The engine is of the two-cycle type. The fuel oil is supplied to the cylinder by a pump operated by means of an eccentric on the main shaft. The eccentric rod is connected to a lever and bell crank, to which is fitted a "hit and miss" gear to control the governor; this acts most efficiently, keeping the engine under control at a normal speed, when running free, as when the reverse gear clutch is in the neutral position. The engine from which the illustration is taken is the smallest unit of this type made by Messrs. Beardmore, and tests carried out for consumption give about ·6 of a pint of fuel oil per B.H.P. per hour. In the larger engines the power developed can be increased above that specified by the use of water drip, thus giving a margin for emergency work. The water tank can be used for a fuel oil supply tank when not used for the purpose of the water drip. A recent simplification of the Beardmore engine is in the compressed air arrangement for starting, where the main engine in the upstroke compresses a certain amount of air, which is passed through the impulse pipe to the storage vessel, thus dispensing with the air pump and reducing the details of the machinery.



Beardmore Oil Engine.

Steamship Navigation Centenary.—In the August, 1912, issue of this journal, an interesting article on the story of the *Comet* was published.

Messrs. W. H. Bailey & Co., Ltd., of Albion Works, Salford, Manchester, will have a very interesting display at the forthcoming Engineering and Machinery Exhibition at Olympia, October 4th to 26th. Their exhibit will consist of pumps, air compressors and steam and water fittings, including all the Company's well-known specialities.

Messrs. J. W. Brooke & Co., Ltd., of Lowestoft, report a very flourishing state of their marine motor business. They have eighty motors on order for completion, aggregating 2,500 odd H.P., a large proportion of which are for shipment to their agents abroad. In addition to this, they have just despatched three teak launches to the Egyptian Government. A 9-knot launch of 25 ft., and a 15-knot launch of 35 ft. length have been recently on trial, together with a new 21 footer for the B.M.B.C. Class, with a new four-cylinder Brooke motor. On the stocks are a 25-ft. shallow draught teak launch with an 18-H.P. Brooke motor for Madras, a 35-ft. cabin launch with a 45-H.P. Brooke motor for Bombay, and another 25 ft. teak launch with an 18-H.P. Brooke motor, also for Bombay, a 33-ft. cargo launch with a 20-H.P. two-cylinder Brooke commercial motor for Pernambuco, a 20-ft. launch with an 8-H.P. Brooke motor for the Customs Service, also at Pernambuco, and a 22-ft. special launch with a 4-H.P. motor to be shipped to Meteline, in the Turkish Islands.

TWIN-SCREW MOTOR SHIP "MONTE PENEDO."

THE first German built motor driven ship, *Monte Penedo*, was given a special trial trip from Hamburg to Cuxhaven and back on August 24th last, when a number of people interested in the subject were invited by the engine builders to be present. This vessel has been built by the Howaldtswerke at Kiel, to the order of the Hamburg-Südamerikanische Dampschiffahrts Gesellschaft, and the propelling and other machinery has been manufactured and installed by Messrs. Sulzer Bros., of Winterthur, Switzerland.

The *Monte Penedo* is a vessel of 4,000 tons gross register, and 6,500 deadweight, and has a length of 350 feet, a beam of 50 feet, and a depth of 27 feet. The vessel, as she appears in the water, is illustrated in Figure I., while Figure II. illustrates the general arrangement of the cargo holds and the disposition of the machinery and oil-bunkers. Through the courtesy of Messrs. Sulzer Bros., we are enabled to give some interesting views of the engines, which consist of two sets of four-cylinder reversible two-cycle Diesel-Sulzer engines. This installation represents the first ocean-going two-stroke Diesel-system constructed. The cylinder diameter is 18·5 ins., and the stroke is 26·8 ins., and at 160 revolutions per minute each set develops 850 brake horse-power.

Fig. 1.—The Motor Ship *Monte Penedo*.

The general arrangement of the engines is illustrated in Figure III., which is a plan, and in Figure IV., which is a perspective view taken from the starting platform. The general construction of each cylinder and water casings is clearly shown in sectional elevation in Figure V., while Figure VI. is a similar view of the scavenging and air-compressing pumps, which are driven direct from a fifth crank at the forward end of the crank-shaft. Figure VII. represents a view of the upper part of the valve-gear of the main engines. The bed plates are cast in three parts and are of similar design to that of the ordinary marine steam engine. The cylinder covers are connected directly to the bed plates by steel columns, so that the explosive stresses are transmitted thereby directly to the bed plates, thus leaving the cylinder bodies free from axial tensile stresses and capable of expanding from the cover in a downward direction. This is very necessary for two-cycle engines where the scavenging takes place through openings in the cylinder walls. Besides these vertical steel columns cast-iron columns are provided to take the transverse stresses and to provide guide surfaces for the crosshead shoes. The crossheads are provided with single-type guide shoes working on plates bolted to the columns. The shoes are lined on their head and astern surfaces with white metal, the guide plates being adjustable and water-cooled. The engines are enclosed by planished steel-plate doors through which there is ample space for inspection and overhaul. Forced lubrication is provided for all working parts, the oil being cooled and filtered before being used a second time. A special pump is fitted for the cylinder lubrication, the oil passing to the pump through a sight feed.

The working pistons are water cooled, the water being led through telescopic pipes without any stuffing boxes, so as to enter the piston head in the form of a free jet; this arrangement is clearly shown in Fig. V.

The cranks are set at 90 deg., and the scavenging pump crank is set at an angle relative to the working cranks to give the best working results. The scavenging pumps are controlled by a piston valve driven from the crankshaft through a Stephenson's link motion. The compressor pumps are of the three-stage type for the supply of air at 955 lbs. per sq. in., used for injecting fuel and the starting and reversing operations. The first stage serves as the crosshead of the scavenging pump, and the remaining two stages are driven from the crosshead through a system of balance levers. All three stages are water cooled, and intermediate coolers are also provided, so that throughout the whole process of compression the air can be kept down to a suitable temperature, while automatic valves are provided, so that no special reversing gear is required.

The scavenging air enters the cylinders through two horizontal rows of openings in the cylinder walls; the lower row being controlled by the piston alone, while the upper row is controlled by the scavenging valves and is eventually covered by the piston. By means of this upper row, air to any desired quantity may be introduced into the cylinder after the piston has closed the ordinary scavenging openings. The exhaust openings are arranged on the opposite side, also in the cylinder walls. The exhaust gases enter a water-cooled exhaust pipe leading to a silencer, from which they escape freely into the atmosphere. This method of scavenging gives not only excellent results in working, but from the point of view of simplicity of design and safety is a decided advance on other existing methods, for should a scavenging valve fail it is impossible for a charge to escape into the exhaust pipe. The cylinder covers are very materially simplified, compared with the usual construction, and are free from the otherwise customary multiplicity of valves and gear, and, in consequence of this particular design, there are only the fuel and starting valves mounted on the covers. As a further result, the reversing gear is thereby much simplified and easier to operate.

The manœuvring gear consists of two mechanisms, each driven by a compressed air engine through a worm-drive. One engine serves to rotate the camshaft through the desired angle relative to the crankshaft, and to put over the scavenging pump excentric rods into the required position for ahead and astern running; the other serves to operate the fuel and starting air valve gear for starting up, running or stopping. Manœuvring may also be performed by hand, so that in the

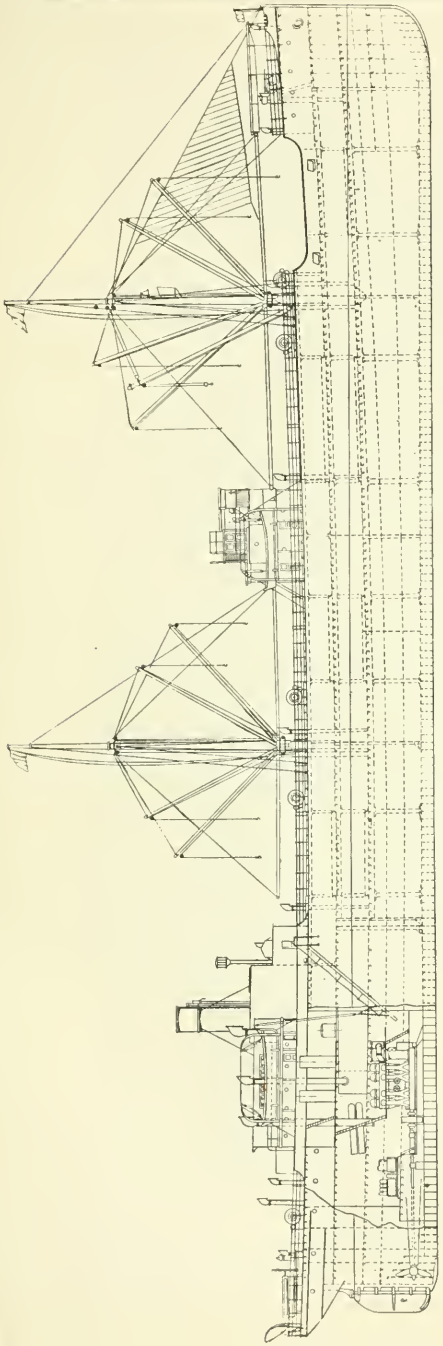


Fig. 2. General arrangement of Cargo Holds and Machinery.

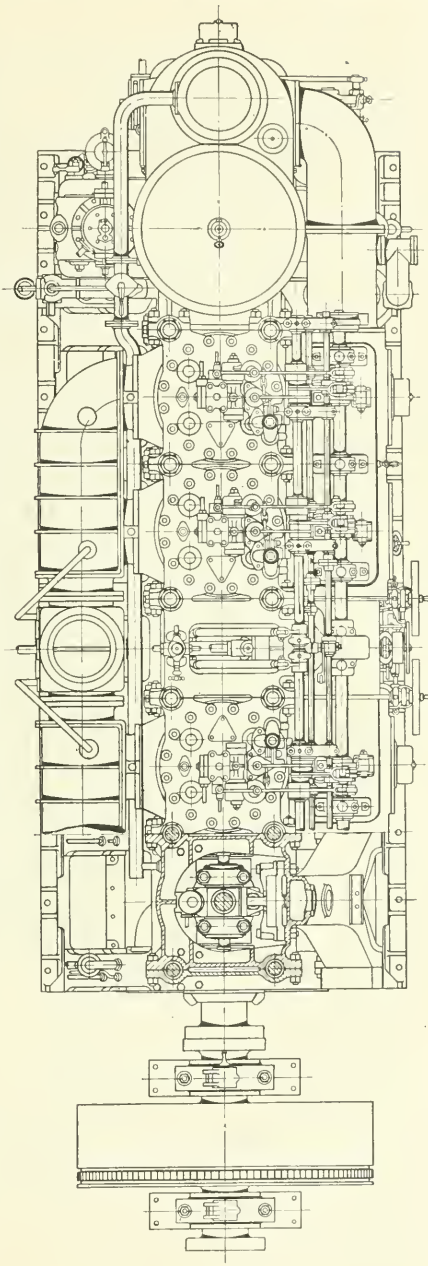


Fig. 3. Plan of general arrangement of Engines.

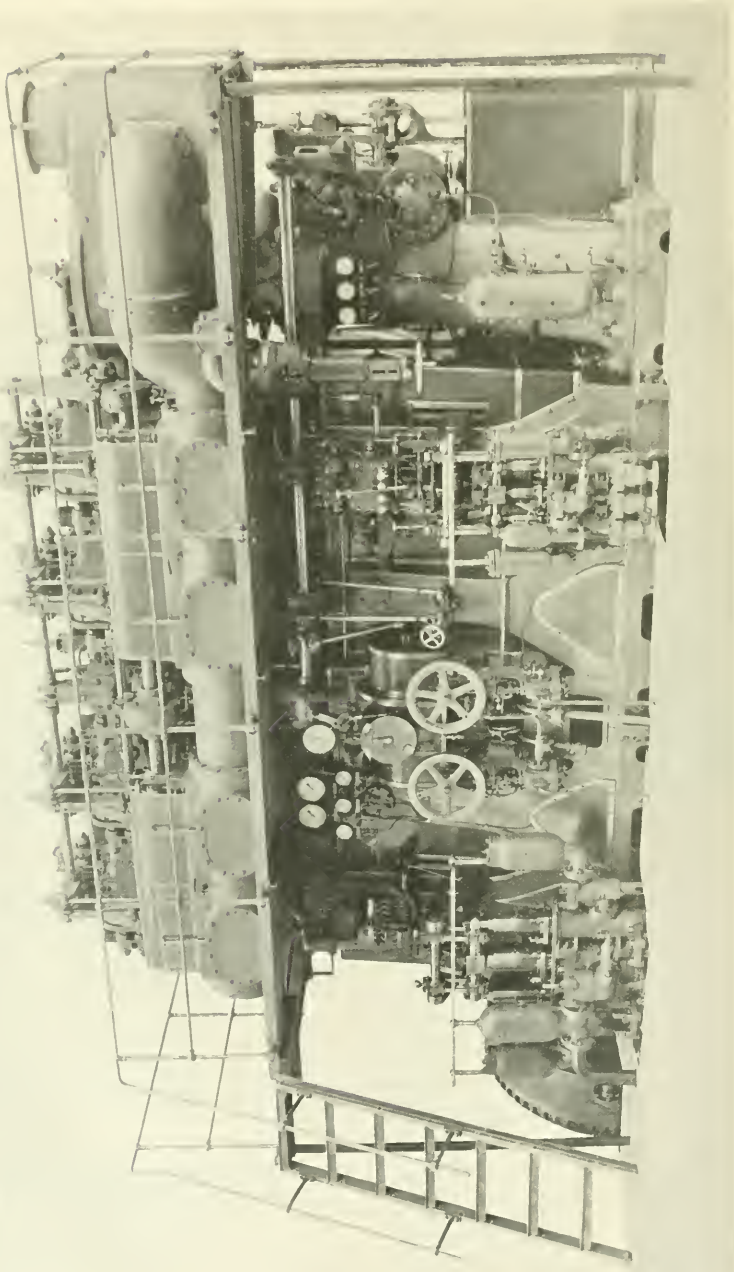


Fig. 4. View of Main Engines from starting platform.

event of the manœuvring engines failing through any cause, no time need be lost in carrying out the orders. As may be seen from Fig. IV., these manœuvring engines are placed centrally on the front of the main engines, and so near to one another that if need be one engineer can manœuvre both main engines. A governor is fitted which, on the slightest increase above the maximum speed, operates directly on the fuel pump.

The pumps for the various services are driven by means of balance-levers from the crossheads of both No. 1 and No. 4 engines, and are constructed of the ordinary design. They

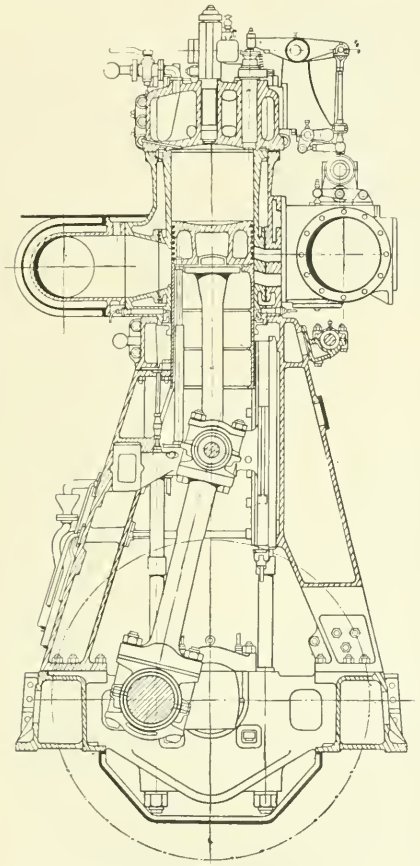


Fig. 5.
Showing construction of each Cylinder and Water Casings.

supply cooling water for the working cylinders, pistons, compressor-cylinders and intermediate coolers, etc., and are utilized also for sanitary and bilge purposes. The sanitary and bilge pumps were designed to be driven off the main engines at the special request of the ship owners, and in consequence, the main engines, as seen in Fig IV., appear somewhat more complicated than they really are. A compressed air turning engine is mounted at the back of each main engine and gears with teeth machined on the periphery of the flywheel, which weighs 8 tons.

The auxiliary machinery consists of two three-cylinder single-acting Sulzer-Diesel motors of 8·07 in. diameter by 8·66 in. stroke, working on the four-stroke principle. Both are of 50 B.H.P. at their normal revolutions of 425 per minute. One motor is coupled direct to a dynamo, which serves for lighting the ship; the other drives a compressor for use in case of emergency or failure of the ordinary air supply, particularly for use when entering or leaving a port, canal or in similar circumstances when large quantities of air are required for manœuvring. The weight of the dynamo and its motor is 7 tons. These two auxiliary sets are shown in Fig. 8, the electric lighting set being on the left-hand side and the compressing set on the right-hand side.

The engine frame is built in two parts and of box form, strengthened internally by columns. The engines are enclosed by light planished steel plates easily dismountable for inspection or overhaul. On the cylinder heads the fuel,

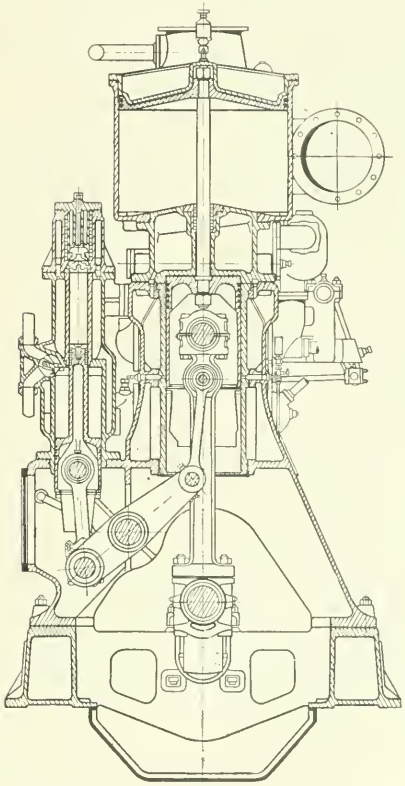


Fig. 6.
Showing construction of Scavenging and Air Compressing Pumps.

starting, admission and exhaust valves are mounted and are operated through vertical rods by cams mounted on a horizontal shaft enclosed in the engine frame. This camshaft is driven from the crankshaft through spur gearing. The valves and valve gear are similar to the usual stationary four-cycle motor design, and the fuel pump is driven direct by the crankshaft. An adjustable governor is fitted which works on the well-known principle of controlling the amount of lift of the suction valves of the fuel pump. An oil pump for cylinder lubrication is cast in one with the fuel pump, the drive being common to both. Forced lubrication is provided for all the bearings and the gudgeon pins by a pump placed inside the engine frame and which draws the oil through

a filter. The oil level can be read off on a conveniently placed gauge. On the forward end of the engines a semi-rotary wing pump, which is coupled to the crankshaft, supplies water for cylinder and compressor cooling.

The nett weight of each main engine is 55 tons, or with all pipes, air flasks, exhaust, silencer, etc., 77 tons; the air compressor and motor weigh 6 tons, or a total of 160 tons.

The fuel consumption of each engine was proved on a forty-eight hours' run at normal working to be .40 lb. per B.H.P. per hour, but as the pumps for the various ship purposes are driven off the main engines, the actual consumption of the latter alone is much lower.

By reference to Figure II., it will be seen that the ship is of the twin-deck type, and is provided with a double bottom over her whole length, so that the space enclosed may be utilized for water-ballast; there are four cargo-holes with deck stanchions suitably spaced for facilitating the handling of bulky cargo. The hull is provided with six water-tight bulk-heads, and is fitted with two masts furnished with booms and winches capable of dealing with goods up to thirty-five tons in weight. The oil-bunkers are disposed athwart-ships, immediately in front of the engine room; special provision being made to prevent any leakage; they are protected by coffer-dams on each side to reduce the risk of damage from collision. The capacity of the bunkers is 700 tons. The deck machinery is operated by steam generated in a donkey-boiler placed on the upper deck and adapted to be heated by oil burners when in port and by the exhaust gases when the ship is under way. The products of combustion from the donkey-boiler are led into a small funnel at the stern of the vessel, which also serves to take the exhaust gases from the main engines. Compared with a steamship of similar size, which would require sixteen firemen the *Monte Penedo* will effect a saving of ten men, only requiring six. This reduction is estimated to effect an economy of about £700 per annum. The weight of steam machinery would be about 400 tons, while in this vessel the weight is only 160, thus effecting a saving of 240 tons. It is estimated that the reduction in bunker weight, in addition to the other economies, will effect a total saving of 900 tons, or about an increase of 15 per cent. of total deadweight capacity. The result of this will be, that, owing to the saving of space in engine and boiler-room, from 8,000 to 10,000 cubic feet can be added to the space available for cargo. During the trial at Hamburg the vessel attained a speed of 10½ knots, but it is anticipated that when a change is made in her propellers this may be improved upon. The consumption of .46 lbs. per brake horse-power per hour, which is about one-third of the coal consumption on a steamship, is slightly higher than the result obtained in the *Selandia*, which, it will be remembered, is fitted with engines of the four-cycle type, although it must be remembered that in the case of the *Monte Penedo* the consumption includes that due to the driving of the air compressor for oil injection and air storage for starting and manœuvring purposes. The *Monte Penedo* started on her first voyage to South America on August 31st, and called at Lisbon on her way. The reports received state that her passage so far has been carried on without the slightest hitch; the average speed was between 10 and 11 knots, and after the call, the vessel proceeded on her voyage without any delay whatever.

"SUCTION" BETWEEN PASSING VESSELS.*

By Professor A. H. Gibson, D.Sc., and J. Hannay Thompson, M.Sc., M.Inst.C.E.

In view of the general lack of experimental data as to the magnitude of the mutual forces involved in the cases of interaction between two vessels moving in parallel paths in close proximity, and as to their effective range of action, the authors decided to carry out a series of experiments to investigate these points on boats of sufficiently large size to enable the results to be applied with some confidence to seagoing vessels. The vessels used were the steam-yacht *Princess Louise* and a motor boat. Each is propelled by a single screw, and their details are as follow:

Vessel	Length between perpendiculars.	Beam	Draught	Displacement.	Rudder Area
	Ft. In.	Ft. In.			
Princess Louise	88 6	13 0	6ft. forward 7ft. aft	—	—
Motor-boat ..	29 6	6 9	2 ft. 3 in.		100 sq. in.

Two sets of experiments were carried out. In the first the helm of the motor-boat was lashed amidships, with the vessels on parallel paths, and its behaviour was noted when at different lateral distances, and when the boats were moving at different absolute and relative speeds. Its position relative to the *Princess Louise* was determined by angular measurements taken from the latter vessel at intervals of fifteen seconds. Pressures at a series of corresponding points on the two sides of the motor-boat were measured at the same instants, with a view to determining the lateral forces involved.

The second series of experiments was devoted to a determination of the helm angle necessary to maintain the course of the motor-boat when in different positions relative to the larger vessel.

Owing to possible collision risks the maximum speed was limited to six knots, which, in the case of the *Princess Louise*, corresponds to eighteen knots in a vessel of the size of the *Olympic*. The results show that with both vessels moving at about this speed with helms amidships, the smaller vessel is drawn into collision from any lateral distance less than a hundred feet (three and a half lengths of the smaller vessel). The precise behaviour depends largely on the relative and absolute speeds of the vessels and on their initial distance apart and initial relative position. These points were discussed in the paper, as was the question of the helm angle required to prevent collision.

The authors are of opinion that the experiments prove conclusively that the forces involved during interaction are much greater than has been generally realized hitherto, while they have been particularly impressed by the rapidity with which collision usually follows the first sign of any interaction.

* Read at the Dundee Meetings, September, 1912, of the British Association for the Advancement of Science.

LIFEBOATS ON OCEAN-GOING-SHIPS.*

By Axel Welin.

The urgent necessity for revising present regulations referring to life-saving appliances at sea has recently been brought home with terrible force to the public mind. Anticipating the ultimate results of the international deliberations at present in progress, the United States Government have already stipulated that every ocean-going passenger steamer must provide sufficient boat-accommodation for every soul on board.

To the lay mind such a rule must appear perfectly reasonable, seeing that no objection on the ground of expense can be permissible in a matter of this nature. But it must be borne in mind that the mere fact of

* Read at the Dundee Meetings, September, 1912, of the British Association for the Advancement of Science.

carrying a full complement of lifeboats implies no guarantee of safety. Unless the boats can be readily manned and launched with a fair degree of certainty, they only constitute so much lumber uselessly carried about. And it may be categorically stated that there are a large number of ships now in commission on which boats cannot be efficiently arranged to accommodate everybody on board.

Considerable improvement may, however, be effected in the conditions hitherto prevailing, and it may safely be said that all the better-class passenger-carrying companies are giving the matter most careful attention. The general adoption of wireless communication between ships, and also the success of anti-rolling tanks, have enormously augmented the value of the lifeboats in cases of emergency. The last-mentioned invention practically removes the risk of boats getting crushed against the side of the ship when lowering in bad weather, and wireless telegraphy has reduced the question to one of providing means for transferring people from one ship to another in case of disaster. Strong seaworthy boats, with the largest obtainable displacement for a given length, will now best meet the requirements, a high degree of navigability being of much less importance than formerly. Detachable deck-houses, life-rafts, and the like, are, in the author's opinion, of very limited value.

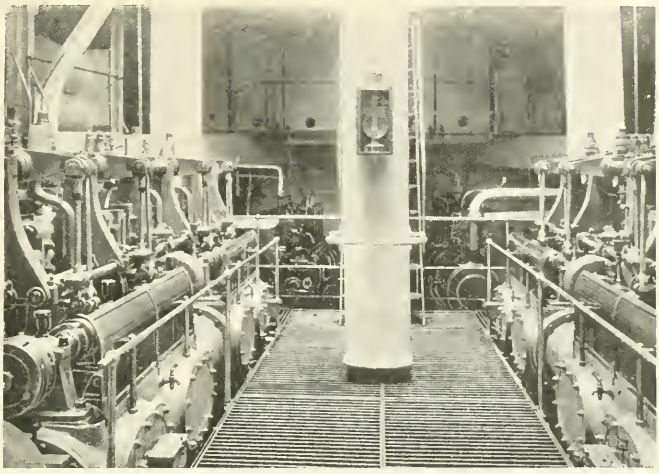


Fig. 7. Showing upper part of valve gear of main engine of the *Monte Penedo*.

On account of the continually increasing height of modern ships, the old question of substituting wire ropes for the usual manila falls has come up again with renewed force. The problem is, however, one of considerable difficulty in view of the ever-varying conditions under which the launching of the boats may have to be carried out.

The first ship to obtain a really efficient davit installation of this nature is the ss. *Imperator*, of the Hamburg-Amerika Line, on which the majority of the boats stand some 70 feet above the water-line. The launching of boats on this vessel may be effected in from forty to fifty seconds, and a special adjusting gear permits of the boat descending at any required angle—a point of the greatest importance. The hoisting is done by means of an electrically-driven "fore-and-aft" transmission shaft provided with "friction-drivers," each boat being handled quite independently of the others. The largest lifeboats are capable of accommodating seventy-six people, and weigh, fully loaded, approximately eight tons each.

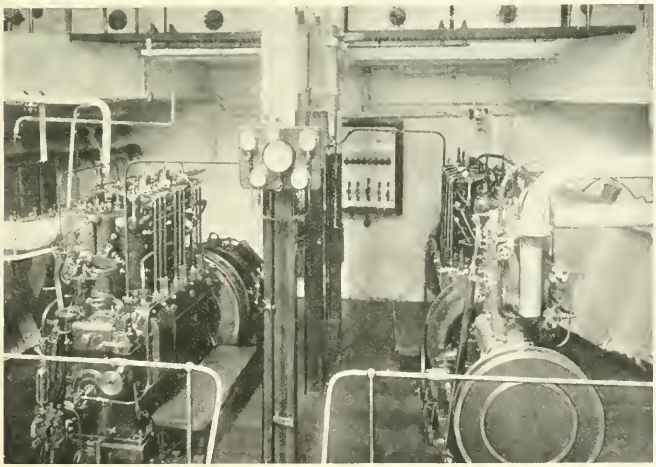


Fig. 8. Auxiliary motors of the *Monte Penedo*.

The Submarine Signal Company have issued a booklet containing a list of the ships throughout the world equipped with their apparatus. The list does not include naval vessels. In the pamphlet is included a complete list of the stations now installed with submarine bells.

MARINE MOTOR NOTES.

It is satisfactory to note that the final tie of the race for the International Trophy has this year been won by a British boat—*Maple Leaf IV.*—belonging to Mr. Mackay Edgar. The boat was built by Messrs. Saunders, Isle of Wight, with engines by The Austin Motor Company, who, naturally, are proud of the result; the speed attained was about 30 knots. Last year the circumstances were unfortunate for the British sportsmen and their racers, and for another year the trophy was retained in America.

The explosion which recently occurred in Ireland in connection with a Diesel oil engine at an electricity supply station, illustrates the danger of making use of gas cylinders charged with oxygen for starting purposes in the absence of the usual compressed air, and which, in this particular case, was not available when required. Now that attention has been called to the danger involved by substituting oxygen for compressed air, even on the suggestion of the engine suppliers, the experiment is not likely to be repeated, indeed one is inclined to wonder somewhat that the risk was taken, in view of the well known properties of oxygen. The new motor vessel for the South American line of Hamburg, the *Monte Penedo*, is now on her first voyage. An illustrated description is given elsewhere in this issue of ship and machinery. This vessel will be followed by another with a somewhat different type of propelling machinery, but of the oil motor style. It will be noted from the references to the President of the Institute of Marine Engineers that the North-Eastern Marine Engineering Company is making arrangements to commence the construction of oil motors for marine service.

The oil motor vessel named the *Eavestone*, 276 ft. long, previously referred to as being engined by Messrs. Richardsons, Westgarth & Co., is now being placed for service, after her trials, to compete with a steam-engined vessel of the same dimensions. Messrs. Furness, Withy & Co., the owners, are about to open an office in Antwerp, with an extension of operations. Messrs. Beardmore have about fifty oil engines in hand, similar in type to that shown at Olympia, and from reports received of those already fitted this class of engine is giving good results. Included among those in hand is a set of 80 B.H.P. for the new pilot cutters for the Trinity House, under construction at Anstruther. A set of 95 B.H.P. has also been fitted to one of the Scottish Motor Coasting Co.'s boats, whose fleet is gradually increasing on the waters of the Forth and Clyde. The various enquiries and orders which have multiplied lately in different parts of the world for lake, river and ocean traffic, as well as for war vessels, indicate that oil engine makers have good prospects to look forward to. The new firms now in course of arrangement to construct works specially to build oil engines, appear, from the signs of the times, to be on safe ground; it should not be overlooked, however, that there are many other directions in which to look than towards the present most-favoured style of internal combustion engine. It is not yet clearly proved that the products of coal or other material more within range of the area of Britain cannot be adapted to the purpose of marine propulsion engines. It is doubtless the case that Messrs. Beardmore's experimental work with the coal gas engines in the *Rattler*, and Mr. Holzapfel's trials with his vessel, have not met with the tide of success that was hoped for; still there have not been wanting signs in respect to consumption costs and prices of fuel—immediate and prospective—to show that the subject is worthy of further consideration and experimental test.

The Carels-Diesel motor vessel *Fordonian*, built by the Clyde Shipbuilding and Engineering Co., launched in July and noted in the August issue, has run trials for about twelve hours on the Clyde, and proceeds to Canada with a cargo for Sydney, C.B., on the way to take up her destined work of traffic on the Lakes.

The Imperial Merchant Service Guild.—The Guild Gazette of September 2nd is a voluminous issue, containing comments on the enquiry held upon the loss of the *Titanic* and some of the lessons to be derived therefrom; report of the various questions set before the Government from the floor of the House, and the replies given; duties of surveyors, as applied to the deck equipment, involving questions as to subdivisions of work; wages paid by various firms, holidays allowed to the office staff and to the staff of officers who occupy themselves on the great deep in guiding the money-making vessels to and fro; petitions presented to firms for redress of grievances, etc. There has been more than enough written and spoken on the details of the deplorable disaster, and no good end can be served by perpetuating the memory of all that has happened, so long as the lessons to be derived from it are sufficiently impressed upon the understandings of those immediately concerned, and the points to be safeguarded duly noted for daily service, so far as they can be. In a journal specially devoted to the navigating department, it is well that the disciplinary control of all that affects a ship's movements should be emphasized, and experiences culled therefrom, in order to add to the education of the present and future generations of the deck officers of the mercantile marine, including inculcation of thoughtful consideration for all those whose lives are, to a great extent, entrusted to them as guards of the course in the open, while the duties and responsibilities of the engineer officers keep them below as the prime movers. Advantage has been taken of the opportunity of the disaster by axe grinders to set forth their wares and trot out their panaceas—inventions and patents of many sorts, so that the public and officials who lack the experience that can only be thoroughly gained through the finger ends, have been bewildered by the storm of wordy argument. That there has been for a considerable time past an insufficient number of surveyors to cope with the growth of steamers and the extended area over which their services are required, has been manifest to those who have immediate dealings with them, and the movement now in hand to increase the number has come very tardily to meet the exigencies of the case. The engineer-surveyors have onerous duties to discharge and, at times, lengthened hours, to cope with their work, but it is questionable policy for the Board of Trade to discourage out-port surveys by increased fees, when it is obviously necessary for commercial reasons to have steamers surveyed outside home ports at times. The firms who do not give fair wages to those who serve them, it may be submitted, deserve to be brought out into view, and there are others than those named in the journal before us who may be dealt with later on, whether by means of applications from their staff or by the more public method remains to be seen; undoubtedly the former method is the better for both employers and employees; it avoids the mud throwing and the unhappy animosity which has been so much fostered of recent years, one result being to cause brooding and restlessness, tending to inefficient performance of duty and a lower ideal of work. The heads of every firm ought to know their own business best, and portion out consistently to those who serve them as liberally as possible, and this by tactful wording of applications may be indicated when overlooked by the firm, but when this method fails to reach the proper quarter, another one is open. Some of the demands we have seen the wording of can hardly be called tactful or free from self-aggrandisement, but possibly courteous applications had failed to carry conviction and justified the *fortiter in re* style of approach.

Iron and Steel Institute.—The Leeds meetings are now being held and continue until the 4th October.

The Smooth-On Manufacturing Co., of Communipaw Avenue, Jersey City, U.S.A., have recently issued their new illustrated catalogue book No. 12, telling how, when and where to use Smooth-On iron cements, paints, sheet packings and corrugated metal gaskets. The Company will be pleased to send a copy of the instruction booklet free of charge to anyone writing to the above address.

The Institution of Civil Engineers.—Under the will of the late Sir James Inglis, a former President of the Institution of Civil Engineers, the Institution has just received a legacy of £5,000, to be applied to its new building, which is now in course of erection in Great George Street, Westminster. This legacy testifies to the marked interest which Sir James Inglis took in the scheme for the rebuilding of the Institution, towards the cost of which he had also, during his life-time, contributed liberally—regarding the occasion as an opportunity to promote the centralization, and thereby the strength, of Civil Engineering interests throughout the British Empire.

SAFETY OF LIFE AT SEA.

New Board of Trade Regulations.

THE new draft rules in connection with the life-saving appliances of ships were issued on September 4th by the President of the Board of Trade.

In his memorandum attached Mr. Buxton states that the Committees of Experts who are considering the questions of the subdivision of vessels by watertight bulkheads, and the best means of stowing and launching boats have not yet reported, so that supplementary or amending rules may be necessary when these reports are received.

The principal portion of the draft rules are appended :—

Foreign-Going Ships.

The principal changes made may be summarised as follows :—

1. Foreign-going passenger steamers, emigrant ships, and foreign-going sailing ships carrying passengers are in future to provide sufficient lifeboat accommodation for all on board.

2. The number of boats to be attached to davits is no longer to depend on tonnage, but on the length of the ship; and the davits must be placed amidships. This rule is subject to modifications where, in the opinion of the Board of Trade, it is not practicable to provide for the number of sets of davits required either in respect of an existing ship or of a future ship; and a ship will not be required to carry a larger number of sets of davits than is sufficient to provide lifeboats for all on board.

3. Appliances or arrangements at least as effective for launching boats may be substituted for davits. Where the boat deck is of excessive height above the water the ship may be required to carry in lieu of, or in addition to, davits some other approved form of launching appliances.

4. Lifeboats must be of a prescribed build. In the term "lifeboat" is included the "decked lifeboat," but not a collapsible boat. Existing collapsible boats are, however, allowed to count for a certain period, after which they will be replaced by lifeboats. (The question how far, if at all, life-rafts should be allowed in substitution of lifeboats, has been referred to the Davits and Boats Committee.)

5. Changes have been made in the rules prescribing the type and dealing with the construction of lifeboats, and the method of ascertaining their strength and carrying capacity. As regards existing lifeboats which do not comply with these rules, the previous recognised carrying capacity will be reduced.

6. A larger proportion of motor boats is to be allowed. The question of the suitability or otherwise of motor boats as ships' lifeboats has been referred to the Davits and Boats Committee.

7. Lifeboats are to be fitted with protective fenders. Their equipment is somewhat enlarged; and every boat must in future carry the prescribed equipment. The boat equipment must be in the boat as soon as the ship leaves the harbour; and must remain throughout the voyage. The number of persons to be carried in each boat, and its dimensions, are to be marked on the boat.

8. All life-jackets and lifebuoys are to be suitably placed, and their position plainly indicated. At least half the lifebuoys must have ignition apparatus attached.

9. The existing General Rule 12, which provides that a lesser number of boats might be provided in the event of the ship being divided into efficient water-tight compartments, is abrogated.

10. Foreign-going cargo steamships are at present required to carry on each side boats (of which one must be a lifeboat) sufficient to accommodate all persons on board. In future sufficient lifeboats must be carried on each side to accommodate all on board; and must be fully equipped. The requirements for foreign-going cargo sailing ships are also somewhat increased; in future they must carry sufficient and fully-equipped lifeboats for all on board.

Home Trade Vessels.

Home trade passenger ships, including cross-Channel and excursion vessels, present a more difficult problem than the ocean-going passenger ships. By the nature of their service the numbers they are authorised to carry, and can safely and conveniently carry, are in many cases considerably greater in proportion to the size of the vessel than in the case of a foreign-going ship. Most of their voyages are short, many of their voyages are performed entirely in daylight; and the numbers allowed to be carried are accordingly fixed on the assumption that the passengers are not berthed in the ship. . . . To impose an obligation on these home trade vessels to carry lifeboats based on the maximum number for which the vessel is certified, would be to demand what is physically impracticable. To provide boats and buoyant apparatus, buoyant deck seats, and the like (apart from life-jackets), would also be in many cases impracticable, especially in the case of the excursion steamers. . . .

The principles on which the new rules deal with home trade passenger ships may be briefly summarised as follows :—

(1) Buoyant apparatus (such as life-rafts, buoyant deck seats, etc.) is recognised as an integral part of the provision as well as lifeboats. This is justified by the nature of the voyages and of the risks encountered, and especially by the fact that, while the provision of sufficient lifeboats for all whom it is desired to accommodate would, in many cases, be impracticable in the case of a home trade passenger vessel, such boats, even if carried, could not be made available in an emergency nearly so quickly as buoyant apparatus.

(2) Lifeboats and buoyant apparatus (other than life-jackets) are required to be provided sufficient for all persons allowed to be carried by any ship under a passenger certificate which is applicable to any voyage outside partially smooth waters, other than a short voyage limited to daylight hours in the summer months or on certain specified days.

(3) In the case of voyages limited to daylight hours in summer, or to smooth or partially smooth waters, the requirements as to lifeboats and buoyant apparatus (other than life-jackets) are suitably reduced.

(4) Life-jackets are required to be carried for all persons on board in addition to any other life-saving appliances, and not in substitution therefor.

(5) As regards existing ships, the new requirements as to the provision of life-boats and buoyant apparatus may, if necessary, be reduced. In the case of the limited voyages referred to in (3), a lower scale of requirements is temporarily applied to existing ships.

Existing Home Trade Ships.

If it is shown that it is not practicable or reasonable in an existing passenger vessel to provide lifeboats or buoyant apparatus to the extent prescribed the requirements of the rules may in that case be modified by the Board of Trade; and the requirement that the lifeboats in a vessel of a certain class shall reach a certain minimum aggregate cubic capacity does not apply to existing ships. But a vessel in Class I. or Class V. (which include cross-Channel Continental boats, and passenger steamships plying along the coast, or between Great Britain and Ireland or the Isle of Man) shall in no case provide boat and buoyant apparatus accommodation for less than 70 per cent. of the total number of persons allowed to be carried by her ordinary passenger certificate.

Home trade cargo steamers (except coasting vessels) are at present required to carry on each side boats (of which one must be a lifeboat) to accommodate all persons on board. In future all the boats except one must be lifeboats, and must be fully equipped. As regards home trade sailing ships, the requirements have been altered so as to ensure that all the boats shall be lifeboats. In every case the vessel must carry sufficient lifeboats for all on board.

The changes in the General Rules to which reference has been made above under the heading of foreign-going ships will apply, with one or two exceptions, to home trade vessels.

Operation of Rules.

The rules will come into force on Jan. 1, 1913, but will not apply to passenger steamers so far as they involve structural alterations to the ship until the lapse of any passenger certificate valid on Oct. 1, 1912, *i.e.*, until the vessel comes up for its annual survey.

Boat Manning.

A revision of instructions is being made, so as to secure a sufficient complement of efficient boat hands to deal with the total number of boats which will now be required to be carried, and to be manned in an emergency. It is proposed that, in foreign-going passenger steamers, within certain limits, the boat hands must be efficient deck hands, while outside those limits seamen of other ratings may be drawn upon to make up the complement, provided that they satisfy the Board of Trade by certificate or otherwise of their competence as boat hands. With regard to the organization of the crew and of systematic boat drill, Mr. Buxton is advised that the Board of Trade have probably no power to make such drill compulsory; and in this matter, as well as in regard to the whole question of manning, it may be necessary to seek for further powers.

Survey of Ships.

After a careful review of the whole situation, Mr. Buxton says it may be necessary to obtain fuller powers from Parliament to enable the Board of Trade adequately to carry out the extended duties for which they will be responsible. In any case considerable strengthening of the surveying staff will be necessary.

H.M.S. "Princess Royal."—This vessel, which has recently created a world's record in speed for vessels of her class, is fitted with Stone's "Turbiston" bronze propellers, cast and finished at the works of Messrs. J. B. Stone & Co., Ltd., at their Deptford works.

The International Engineering and Machinery Exhibition, organized by the Machine Tool and Engineering Association, Ltd., will be opened on October 4th by the Earl of Selborne. The exhibition will remain open until the 26th of the month. All space has been booked, and a very fine exhibition is promised.

FOREIGN NOTES.

Austria.

THE cargo steamer *Lucia*, built to the order of the Austria American Co., has been successfully launched at the Cantiere Navale Triestino. Her length is 132·3 m., beam 16·4 m., with 9,000 tons displacement. The *Lucia* is to enter into the Transatlantic service as soon as possible. The protected cruisers "G" and "H," now in course of construction, and each of 3,500 tons, are to be launched in October at latest.

Denmark.

The Forenede Dampskibs Co. at Copenhagen has placed an order for a cargo and passenger steamer of 8,000 tons, fitted with refrigerating plant, with the Tecklenborg Shipyard of Geestemunde. A steam engine of 2,400 h.p. will give the vessel a speed of 12 knots.

The shipyard of Burmeister and Wain at Copenhagen have orders in hand for nine motor ships totalling 40,000 gross tons.

France.

The Chantiers de Provence have just launched the mail steamer *Duc d' Aumale* of 5,000 tons, a sister ship to the *Carthage*. The vessel is intended for the Marseille Oran line.

The Compagnie Transatlantique has placed an order for a twin-screw steamer to be called the *Porto Rico*, of the following dimensions:—Length, 130 m.; beam, 15·6 m., with a displacement of 9,000 tons. Two engines totalling 4,000 h.p. will propel the *Porto Rico* at a speed of 17 knots. The fittings of the new steamer will be luxurious and comfortable in every respect.

The Société Navale de l'Ouest has placed an order for two steamers of 7,500 tons with the Chantiers de France, to be named *St. Louis* and *St. Michael*.

Germany.

The Neptune shipyard is being extended to meet the growing demands. A large ship construction shed is being erected to take in very large vessels.

The new steamer *Zanzibar* has just been successfully launched by the Koch Shipyard at Lübeck. She has been built to the order of Messrs. Oswald & Co., at Hamburg, and is to maintain a regular service between Hamburg and the East African ports. The *Zanzibar* has a carrying capacity of 1,900 tons on a draught of 5·3 m., and will be propelled by an engine of 900 i.h.p., attaining a speed of 12 knots. She is amply provided with accommodation for the crew and the passengers will find cabins and saloons very comfortably fitted.

At the shipyard of Messrs. Stock & Kolbe, at Kiel, the motor steamer *Hermann Kabb*, built to an Argentine order, was launched successfully. The length is 57·6 m., beam 9·25, with a carrying capacity of 800 tons. The two motors, each of 200 h.p., will be directly reversible and constructed on the Benz-Hentelman system. The fuel oil tank will have a capacity of 70 tons of oil.

The s.s. *Hobart*, built to the order of the German Australian Steamship Co. at Hamburg, has just gone through her trial runs, and as these were up to contract the ship was immediately taken over by the Company. The dimensions of the vessel are—Length 142 m., beam 18 m., with a carrying capacity of 9,500 tons on a draught of 7·6 m. She is fitted up with a triple-expansion engine of 4,000 i.h.p.

The *Sierra Nevada*, built at the Vulcan Shipyard to the order of the North German Lloyd at Bremen, has just been successfully launched. Her length is 133·3 m., beam 17 m., tonnage 8,000 on a draught of 8 m., with a speed of 13 knots. The steamer is intended for service on the La Plata line and has accommodation for 116 passengers in the first class, seventy-four in the second class, and 1,270 between decks. The ventilation is specially arranged to suit the tropical conditions. Boats are provided of sufficient capacity to carry all on board. The *Sierra Nevada* is a twin-screw steamer and is provided with two triple-expansion steam engines of 4,300 i.h.p.

The Hamburg-America Line has placed an order for the construction of a steamer with the "Vulcan" Co., of Hamburg, to serve the North Sea watering places. The motive power is supplied by a turbine to give the vessel a speed of 20 knots. The same Company has placed an order with the Bremen Vulcan at Vegesack for two cargo steamers, each to be of 13,000 tons, with a speed of 13 knots.

The steamer *Ramses*, built to the order of the "Kosmos" Steamship Co., at Hamburg, has just been successfully launched. Her length is 140 m., her beam 18·5 m., and her carrying capacity 12,000 tons on a draught of 8·1 m.

The Tecklenborg Shipyard at Geestemunde has a large number of steamers in hand, nine of these to the order of the German-Australian Steamship Co., which will be delivered in the course of this and the following year.

The motorship *Rolandseck*, built to the order of the Hansa Steamship Co., has just been launched. This vessel will be propelled by a six cylinder single acting two-cycle motor, which is ready to be placed into the ship.

The Neptune Shipyard has just launched the *Amalfi* of 3,000 tons, built to the order of the Sloman Shipping Co., at Hamburg. This shipyard has three more steamers for the same Company in course of construction.

The following dividends have been paid by some of the German shipyards on profit and loss accounts of last year:—

The Bremen Vulcan	10	per cent.	dividend.
Oderwerke at Stettin	6	,,	,,
Blohm & Vass, Hamburg	5	,,	,,
Koch, Lübeck	5	,,	,,
Reiherstieg, Hamburg	4	,,	,,
Tecklenborg, Geestemunde	4	,,	,,
Flensburg Shipyard	4	,,	,,
Weser, Bremen	4	,,	,,
Neptune, Rostock	0	,,	,,
Howaldt Works, Kiel	0	,,	,,

Holland.

The cargo screw steamer *General Archinard*, built to a French order, has just been launched at the Ramsum Shipyard, near Delfzyl. She is provided with an engine of 400 i.h.p., and is intended for general cargo purposes.

The Rotterdam Dry Dock Co. has just launched the *Alcor*, a cargo and passenger steamer for a Dutch shipping company. The *Alcor* has a carrying capacity of 5,600 tons, being 106 m. long with a beam of 14·6 m. and 7·4 m. depth.

Italy.

The Navigatione Generale Italiana at Genoa has placed an order for five motor vessels for the Transatlantic service. They are to have each a carrying capacity of 10,000 tons.

An Italian shipping firm has bought the Hamburg steamer *Bitschin* and she has already left Hamburg under the Italian flag, being navigated by an Italian captain and crew to her destination. She was built in 1895 and is of 2,000 nett register tons.

Japan.

The report for 1911-12 of the Nippon Yusen Kaisha (Japan Mail Steamship Co.) shows the Company to have had an exceedingly prosperous year. The trading revenue was £2,058,320, and after deducting all expenses there remains a nett profit of £1,459,982, including £379,822 brought forward from the preceding year, enabling a distribution of a 10 per cent. dividend. The fleet consists of seventy vessels of a total tonnage of 287,193 tons. Six new steamers are in course of construction.

Russia.

It is reported that new shipyards are to be laid down, not only at Reval by two influential companies, but also at various other ports. Extensive sites, it is said, have been acquired for this purpose. One company is said to be Russian, and the other in the hands of French capitalists.

A new company, "Hugo Stinnes," has been formed at St. Petersburg for the purpose of acquiring floating docks and utilizing them for coaling in port and at sea, namely, in the Baltic, at the ports of Reval, St. Petersburg and Cronstadt.

U.S.A.

The Matsin Navigation Co. at San Francisco has placed an order for a cargo and passenger steamer with the Newport Shipbuilding Co., Pa., for the San Francisco-Hawaii service. The price of the steamer is 1,350,000 dollars. The length is 500 ft., the greatest beam 58 ft. and the depth 36 ft. The motive power is placed aft and consists of a four-cylinder triple-expansion engine of about 9,000 i.h.p., to give the contract speed of 16 knots. The boats provided will be able to accommodate every one on board, one of them being a motor boat. The vessel is to be ready for service in fifteen months. The steamer is also to be fitted so that it can be used as an auxiliary cruiser in case of war.

SUMMERS HUNTER, Esq.,

PRESIDENT OF THE INSTITUTE OF MARINE ENGINEERS.

SESSION 1912-13.

WE have pleasure in presenting to our readers a portrait of the President of the Institute of Marine Engineers, who was elected in succession to the Most Hon. the Marquis of Graham. The selection of the president-elect having been made by the Council in December, 1911, the election was ratified by the ballot vote of the members, declared at the Annual Meeting, held in March, 1912.

From the knowledge we have of Mr. Hunter there is no doubt that the maintenance of the high traditions of the Institute are safe in his hands, and during his year of office the motto of the Institute, inscribed on the crest, "Ahead," will prove to be the watchword for the various departments of the work, especially as the new President brings some experience to bear upon the position, as he is a Past-President of the North-East Coast Institution of Engineers and Shipbuilders and has been for 12 years managing director of the North-Eastern Marine Engineering Company.

Born at Inverness in 1856, Mr. Hunter received the groundwork of his education at the Old Royal Academy there, and at the early age of fourteen was apprenticed to Messrs. Barker & Cope at Kidsgrove, near Stoke-on-Trent, where this firm carried on an extensive engineering business. By persistent study at Science Classes in the Wedgewood Institute, Burslem, he made up for his early removal from school, and secured many prizes, besides making

steady progress in his work. He was largely influenced, during the beginning of his experience of life, to take the right path by meeting with, and working for, well known men, among others, the first Sir George Elliott, Mr. Geo. Bidder—known as the calculating boy—also Mr. S. Bidder—well known civil engineers, whose names will be remembered in connection with great engineering and industrial undertakings. During his apprenticeship Mr. Hunter was placed in charge of various important jobs on behalf of Messrs. Barker & Cope, gaining at the same time valuable experience in the different branches of engineering identified with the North Staffordshire industries. Having decided to pursue marine engineering, he started work with the North-Eastern Marine Engineering Co. (under the late Sir William Allan), at their Sunderland works in 1880. After a short time in the shops he went to sea for over two years. His sea experience included a somewhat exciting shipwreck, so that he ought to have a full appreciation of the engineer's duties and responsibilities. After obtaining his chief engineer's certificate, he received an appointment on the staff of the North-Eastern Marine Company at their then new Wallsend works, of which he was, in 1895, appointed General Manager and elected a Director of the Company. Since then his advance has been steadily progressive and in 1900 he was appointed Managing Director, with control of the Company's works at Sunderland and Wallsend. Under normal conditions these works employ about 4,000 men, and are adapted for the building of marine engines of the largest size.

The Schmidt system of superheating was adopted by the firm with a view to economy in the steamers which they built, when circumstances admitted of their initiative, and they were the first to take it in hand. Several sets of engines, both triple and quadruple expansion, have been fitted with the system. The oil engine has received a good deal of attention and study from Mr. Hunter and this is now bearing fruit, as the firm have the Diesel engine under consideration in preparation for constructing it in the near future.

The invention of labour-saving appliances has successfully occupied his attention, and it may also be said that Mr. Hunter was one of the first in the North-East Coast district to recognise the great possibilities of electric driving. After numerous experiments and tests the entire electrification of the Company's works at Wallsend was decided upon. A complete equipment of electrical driving plant, including overhead travelling cranes, etc., was installed in 1900, the current being obtained from the Neptune Bank Power Station. In the course of the following year the Sunderland works were electrified and for a long time the N.-E.M. works were the largest consumers of current in the country, from electric supply companies.

Mr. Hunter's progressive spirit and initiative has been apparent in numerous improvements introduced from time to time in connection with the Company. The memory of his own early difficulties has caused him to be ever desirous of giving all encouragement to apprentices anxious to improve themselves in knowledge of technical science. He believes in utilizing, as far as possible, the deserving talent trained by the firm, and a number of those who now occupy responsible positions at the Works served their apprenticeship and also worked under him. This system has created a certain good fellowship and *esprit de corps* which could be attained no other way. It makes for the success of any undertaking and particularly so in engineering and shipbuilding.

Amid the numerous and important calls made upon his time, Mr. Hunter has been able to take an interest in public matters. He was an active member of the old Volunteer movement, and was instrumental in raising two Companies in Wallsend, holding the rank of Captain in one of the Battalions of the Northumberland Fusiliers, and it was largely due to his efforts that Wallsend was provided with a Drill Hall of spacious size. He has also taken part in the Municipal life of Wallsend, and held a seat on the Board of the Urban District Council for some years. He is a member of the Institution of Civil Engineers, and of other scientific societies; he is a vice-president of the Institute of Metals, and is a responsible member of the Engineering Trades Federation; he is also a Director of the Iron Trades Employers' Insurance Association, and of the Tyneside Tramways and Tramroads Co.

Mr. Hunter has earned a reputation for technical skill combined with practical judgment, while the material success to which he has attained has been won by perseverance, industry and honest effort. Of deep convictions and sympathetic character, he has the subtle power of making friends and securing respect in the various circles in which he moves, while the keystone of his nature—set on sincerity and sterling honesty of purpose—has not only gained him popularity, but whatever he has undertaken he has been able to carry to a successful issue.

The Presidential Address is to be delivered at the premises of the Institute on Monday, October 14th, at 8 p.m., and the Annual Dinner of the Institute is to take place on Friday, November 8th.

NAVAL MATTERS—PAST AND PROSPECTIVE.

(*From our Own Correspondent.*)

Portsmouth Dockyard.

We are very busy in all departments and overtime is being worked in many of the workshops so as to prevent delays in other directions. The new battleship, *King George V.*, is well advanced, and her barbette guns have been placed in position. Her steam and gunnery trials are to take place shortly. It is confidently anticipated that the vessel will be ready for the pennant within two years from the date of her laying down, which will be on January 6th next. The Duchess of Wellington is to launch and name the battleship *Iron Duke* on Saturday, October 12th. The date is somewhat earlier than was originally expected, but the preliminary work upon the battleship which is to follow the *Iron Duke* upon the slips is well forward, and the Admiralty wish to start building her as soon as possible. The launch of the *Iron Duke* is therefore being expedited. Before much progress can be made with the new vessel the slipway is to be strengthened at the water end. From what has transpired it seems certain that the new ship will be longer and of greater displacement than any battleship yet built. Up to the end of next March the sum of £166,775 is to be expended on her construction. The battleship *Albemarle*, which has undergone an extensive refit, including the opening up of her machinery for examination and the bringing of her fire-control and wireless arrangements up

to date, has been completed. The cruiser *Diadem* is undergoing extensive repairs, and the scouts *Pathfinder*, *Sentinel* and *Skirmisher* have been taken in hand for a partial refit and to be re-armed with 4-inch guns instead of the 12-pounders they have hitherto carried. The battleship *Neptune* is to come in early in November for refit. The cruiser *Royal Arthur* of the Third Fleet at this port, will, it is stated, be the flagship of the squadron which is to be based at Berehaven. The battleship *Hood*, which flies the flag of the senior officer on the coast of Ireland, is about to undergo a thorough refit, after which it is understood she will be sent to Alexandria as depôt ship of the new destroyer flotilla which is to be stationed there. The cruiser *Glasgow* has been paid off and recommissioned for special service in the South Atlantic, relieving the cruiser *Active*. It is understood that the Admiralty are well pleased with the result of the trials of the destroyer *Badger*, which recently arrived here from the Clyde, where she was built by Messrs. Denny. The vessel has been fitted with a new form of turbine engine, which, it is said, will, if successful, prove a close rival to the internal combustion engine. The feature of the new principle is a system of gearing designed by Sir Charles Parsons, the effect of which is to produce not only economy in space but also in fuel consumption, while greater speed is obtained. The new floating dock has been subjected to a series of severe stability tests since its delivery, and it has now been placed in the permanent position it is to occupy alongside the dockyard extension. The dock, whose lifting capacity is 40,000 tons, will shortly be tested by docking one of the latest super-"Dreadnoughts." The second dockyard sale is to take place on October 8th.

Devonport Dockyard.

The battleship *Marlborough* is to be launched on Thursday, October 24th, instead of on Saturday, the 26th, as was expected, as the tide will be more favourable on the former day. The vessel will then have been on the slip barely nine months, she having been laid down on January 25th. In order to get her ready, overtime is being worked on the vessel. In connection with the naming ceremony, the name of the Duchess of Marlborough has been mentioned, but nothing is known officially. Good progress is being made with the battleship *Centurion*. The second funnel has been shipped, and the work of closing in the deck casings and uptakes is well in hand. The mast, which is now placed in position, carries at its head a "control" and "fire director" platform, with supporting fittings for the boat derrick, and wireless masts. The position selected for it is such as will prevent the firing being interfered with by gases from the funnels. A further consignment of 13·5 in. guns has been received, and the remainder are expected at an early date, as are also the mountings and barbette machinery. The *Marlborough's* successor, for which £166,073 has been provided in the Estimates, will no doubt be commenced in November. The name of the vessel has not been disclosed, and little is known as to her characteristics beyond the fact that her displacement will eclipse that of any battleship previously built here. It is understood that she will have a curved armoured deck to resist attack from aircraft. The slip upon which the new cruiser of the improved "Bristol" type is to be built is being prepared in readiness for the laying down. The two 1,000-ton oil fuel vessels are to be named the *Carol* and *Ferol*. They will be commenced simultaneously on the same slip. One of the vessels will be of the internal combustion type. The cruiser *Powerful*, which has been appropriated for service as overflow training ship, has been moved to No. 10 dock preparatory to commencing her new duties. Having successfully completed her official steam trials, the battle-cruiser *Princess Royal* was docked on September 14th to have her propellers changed, special ones having been used for the trials. She has since left to carry out further trials. The vessel has attained the record and phenomenal speed for vessels of her class, of 34 knots per hour. The cruiser *Theseus* has completed a most extensive refit and has been commissioned for service in the Ninth Cruiser Squadron, Third Fleet. The battleship *Prince of Wales* has arrived for refit and to change her four 12-inch guns, they having fired the regulated number of rounds. Advantage was taken of the guns being out to overhaul the sighting and mounting fittings. The work of rearming the patrol cruisers *Adventure* and *Attentive* with 4-inch guns in place of 12-pounder quickfirers is making good progress. The work of adapting the shell rooms and magazines to accommodate the heavier and longer ammunition is also in hand. The destroyer *Brisk* has completed her refit and rejoined the Second Flotilla. Torpedo-boats Nos. 054, 067, 072 and 074, which were built in 1886, have undergone a most extensive overhaul. It is understood that they will be utilized for towing targets when artillery practice is taking place from shore defences. After doing duty for several years as yacht of the Commander-in-Chief, the *Vivid* has been acquired by the Royal Technical College, Glasgow, for use as a training ship for the mercantile marine. She will be stationed in the Clyde. Engineer-Commander W. Hardwick, who retired on reaching the age of fifty, entered the Service in 1884, and served in the *Blonde* on the Cape of Good Hope station during the Sierra Leone rebellion of 1898. Since May of last year he had served in the battleship *Victorious* at this port.

Chatham Dockyard.

There is plenty of work in the yard just at present, and quite a large number of vessels are undergoing repairs. The scouts *Foresight*, *Forward* and *Patrol* have been taken in hand to be rearmed with 4-inch guns, which will involve alterations to their magazines, and the vessels are also to undergo a general overhaul. The battleship *Lord Nelson* has come in for her annual refit and the cruiser *Falmouth* has also been taken in hand. On the completion of the summer cruise of the Training Squadron, the armoured cruiser *Berwick* arrived for a refit. The *Antrim*, of the Fifth Cruiser Squadron, is to be prepared for service as flagship of the Third Cruiser Squadron in place of the *Shannon*. The *Antrim* is to arrive by the end of the first week in October for her annual refit, and the necessary alterations are to be made in readiness for her to hoist Rear-Admiral Sturdee's flag on December 1st. The cruiser *Juno*, of the Third Fleet at the Nore, will relieve the cruiser *Diamond* temporarily as senior officer's ship in the Fifth Destroyer Flotilla on the latter vessel coming into dockyard hands at the beginning of November for a refitting outfit. The depôt ship *Tyne*, of the Eighth Destroyer Flotilla, has come in for refit. The armoured cruiser *Bacchante* has completed refitting and has gone to No. 16 buoy in Sheerness Harbour, arrangements having been made to berth the ships of the cruiser group of the Third Fleet in the Medway, so as to provide additional berthing space in the steam basins here. The destroyers *Scorpion* and *Foxhound* have completed refitting and proceeded to Portrose to resume duty in the Third Flotilla, and the *Scourge*, of the same flotilla, has been taken in hand. The ocean-going destroyer *Saracen*, of the Fourth Flotilla, has arrived for refit, and the *Zulu* and *Nubian*, of that flotilla, have been taken into the South Lock for docking, for an examination of their under-water fittings, and for their hulls to be coated with preservative composition. The destroyer *Afridi* has been paid off from the Fourth Flotilla and placed in charge of a care and maintenance party until the completion of her refit. The *Kale* and *Derwent*, of the Fifth Destroyer Flotilla, have come in to be refitted, and the Rattlesnake, of the Third Flotilla, will shortly arrive. The despatch vessel *Surprise*, which is being refitted, is to be renamed *Alacrity*, on her being commissioned for service in the Far East to relieve her sister vessel *Alacrity*, which has served ten commissions on the China Station. The battleship *St. Vincent* was undocked on September 2nd and proceeded down the Medway to the new floating dock, where her under-water fittings were seen to and her hull coated with preservative composition. A much larger vessel, the battle-cruiser *Lion*, is to be the next vessel which will go in the floating dock. The *Lion* is 26,350 tons displacement, 7,100 tons in excess of the *St. Vincent*.

Sheerness Dockyard.

We had a visit towards the end of August from the First Lord of the Admiralty. Mr. Churchill went through the various workshops and round the docks and basins, manifesting a keen interest in the work in progress. The floating dock in Saltpan Reach was naturally visited, the First Lord boarding the dock and going over it. A test of the dock was made on September 3rd by the docking of the battleship *St. Vincent*, which has a displacement of 19,250 tons. The dock was submerged 36 feet above the blocks, and at half-past eight the vessel left her moorings in the harbour and

steamed to the dock, entering it from the Port Victoria end. The vessel was warped into the dock, and after she had been safely berthed upon the blocks and the first set of shores had been placed in position, pumping was begun and she gradually rose. When the ship had been lifted about 15 feet pumping was suspended to enable another set of shores to be fitted. In all three sets of shores held the *St. Vincent* in position with a few extra supports under her bilge keels. The docking was accomplished without a hitch, and by the afternoon the battleship was high and dry. On September 14th the dock was submerged for the undocking of the vessel, which has since left for Scottish waters to rehoist the flag of Rear-Admiral Madden. The refit below the water-line was carried out by workmen from Chatham, several hundred of whom were conveyed to and fro daily in a Government tug. The under-water fittings and valves of the *St. Vincent* were thoroughly examined and her hull coated with preservative composition. At the beginning of the month eight destroyers of the "River" class were in hand refitting, all of them belonging to the Fifth Flotilla. The *Liffey*, *Test*, *Dee*, *Ouse*, *Exe* and *Eme* are now out of hand and have rejoined the flotilla at Granton. The *Doon*, which has completed her battle practice, has arrived for refit. The torpedo-gunboat *Leda* has had her defects made good and has left to resume fishing duties in the North Sea. Torpedo-boats Nos. 3 and 16, of the Eighth Flotilla, have been taken in hand for their defects to be made good. Submarines C9, C12 and C13 have completed their refits and proceeded to Harwich to rejoin the Sixth Flotilla. C7 has also resumed her duties after having her hull coated with preservative composition. A submarine salvage boat, specially built for the Admiralty by Messrs. Vickers, arrived from Barrow on September 16th. With this craft a sunken submarine can be lifted and taken into dock. The boat, which will be known as Yard craft *No.* 96, is 160 feet long, can lift 1,200 tons, and has cost nearly £42,000.

Pembroke Dockyard.

One of the turbines of the cruiser *Amphion* has been delivered, and the other is shortly expected. The turbine is the first of the latest type manufactured by Messrs. Parsons, and weighs 83 tons. The date provisionally fixed for the steam trials of the vessel is November 25th. It is anticipated that the cruiser *Fearless* will also be delayed, as her twelve Yarrow water-tube boilers are not expected to be delivered until the end of the year owing to a mishap in their construction. The cruiser *Nottingham* continues to make fair progress, but it does not appear as if she will be launched during the present year. The plans and specifications for the new light armoured cruiser are being awaited anxiously. Mr. Churchill recently said that the specifications were ready and would be sent out before November. There is a rumour that an order to build an oil ship will shortly be placed at this yard. It is to be hoped that the rumour proves to be correct, for the order would be very welcome. The destroyers *Nith* and *Ness*, of the Fifth Patrol Flotilla, are to be retubed at this yard, the former arriving here early in October and the latter about a month later. On the completion of the refit of the *Waveney*, about November 5th, the *Nith* is to be paid off, her crew being turned over to the *Waveney* and navigating that vessel to Chatham. On the completion of the *Ouse*, about November 23rd, the *Ness* is to be paid off and the *Ouse* recommissioned by her crew. The German cadet training cruiser *Hertha* recently paid us a visit. During her stay members of her crew, which number 460 officers and men, were ashore daily, and visited Pembroke Castle and other places of interest. A gymkhana was held at the Garrison Cricket Ground, and there was a race for cutters of the ship at the Milford Haven Regatta. There was also a football match between the Pembroke Dock Athletic Club and the ship's company.

INSTITUTE OF METALS.—The autumn meeting of this Institute was held on the 25th and 26th of last month.

THE SAILING SHIP "LA FRANCE" constructed by the Chantiers et Ateliers de la Gironde Bordeaux and launched last year, is the largest sailing ship with auxiliary motive power yet built. She is provided with twin-screws driven by two Schneider-Carels Diesel engines of 900 h.p. each. The vessel is 430 ft. in length over all, 57 ft. 3 in. beam, and has a draught, when fully loaded, of 23 ft. 8 in.

OBITUARY.

David Christie Hamilton.

WITH much regret we have to place on record the death of Mr. David Christie Hamilton, marine superintendent, and one of the directors of the Clyde Shipping Company, Glasgow. The sad event took place suddenly on September 6th at his residence, Flemington, Glencairn Drive, Pollokshields, Glasgow. The deceased gentleman, was at business so recently as two days prior to the fatal seizure, and this suddenness added poignancy to the keen regret which his demise occasioned in shipping and engineering circles throughout the Clyde and other centres. Born in Motherwell, near Glasgow, Mr. Hamilton served his apprenticeship as a marine engineer with the well-known, but now defunct, firm of Messrs. Tod and MacGregor, Partick (now Messrs. D. & W. Henderson & Co.), and on the expiry of the period he served some years at sea. Thereafter he entered the drawing offices of Messrs. A. & J. Inglis, Pointhouse, and later he was engaged in a similar capacity with Messrs. Robert Steele & Co., Greenock—a firm now also of the past. In 1873 he was appointed superintendent engineer to the Clyde Shipping Company, and some years ago he was given a place on the directorate of the Company. The extensive fleet of coasting, cross-Channel and ocean-going steamers, as well as the numerous steam tugs owned by the Company, it is a matter of common knowledge, he maintained all through in admirable condition, while his ingenuity and skill as a designer were as notably exemplified in every new addition to the fleet. Mr. Hamilton is survived by his wife, three sons and two daughters, for whom much sympathy is felt.

DAVID CHRISTIE HAMILTON

Clement Mackrow.

It is with the deepest regret that we have to record the tragic death of Mr. Clement Mackrow, the manager of the shipbuilding yard of the Thames Iron Works, Shipbuilding and Engineering Co., Ltd., Canning Town. On the 23rd of September he was leaving the works in his motor-car and had to cross one of the level crossings of the railway line adjacent to the works, and when on the crossing, a shunting goods train struck the car at right angles, throwing Mr. Mackrow, the sole occupant, on to the line, the engine passing over his body.

Mr. Clement Mackrow started in the Thames Iron Works as a lad under his father in the drawing office, and, after going through all the practical and theoretical training for a shipbuilder, he rose to the position of chief draughtsman, and about twenty years ago was appointed the manager of the shipbuilding department of the concern. On the death of his father, the late Mr. George C. Mackrow, in February, 1907, Mr. Clement Mackrow was appointed to the position of Naval Architect of and Director to the Company, whilst retaining the active management of the constructional work. He was fifty-seven years of age, and at the time of his death had completed over forty-two years' service. During this period a large number of vessels of all descriptions, and for many countries in the world, have been constructed at the Thames Iron Works, and those for the building of which Mr. Clement Mackrow was responsible, as manager, comprise the following:—*Sans Pareil*, *Blenheim*, *Grafton*, *Theseus*, *Black Prince*, *Nautilus* and *Thunderer* for the British Navy; the *Fuji* and *Shikishima* for the Japanese Navy; eight gunboats for the Roumanian Navy; ten river steamers for the London County Council, in addition to a variety of small craft for passenger and goods traffic on British and Foreign rivers.

The deceased gentleman was the author of a well-known pocket book on naval architecture entitled "Naval Architects' and Shipbuilders' Pocket Book," which has run through many editions. He was held in very high estimation by all classes in the East of London, and commanded the confidence of the workmen, as evidenced by the acceptance by them of the terms formulated by him in the recent strike at the Works. Mr. Mackrow was a member of the Institution of Naval Architects, and resided at Oaklands, South Woodford. He was married, but leaves no children.

The Diesel Engine Co., in consequence of the great expansion of the Company's business, have removed from Queen Victoria Street to more commodious head offices at General Buildings, Aldwych, Strand, London, W.C. All communications should be directed to the new address.

CORRESPONDENCE.

We do not hold ourselves responsible for the opinions expressed by our correspondents.

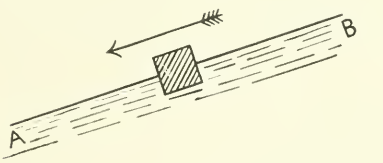
To the Editor of The Marine Engineer & Naval Architect.

Sir,—In your article on "An inexpensive form of experimental tank," Sept. issue, after referring to Euler's and Lagrange's stand points from which the resistance of a vessel in its passage through the water may be viewed, you say:—"As the relative motion is the same in both cases the force required to tow a model through the water at a certain speed will be the same as that required to hold it stationary when the water is *flowing past* (italics mine) at the same speed." I am, of course, aware that this is what is regularly taught; but I do not think that experiment will confirm it; nor do I think the deduction is sound *theoretically*. M. Alexandre Sée, who holds your view, says "There are nevertheless some experimenters who have not perceived this principle (relative velocity), and who have thought it necessary to make experiments in the two cases, and who, wonderful to relate, have found entirely different results.

"Such is the case of Duchemin, who registers results like this: 'The resistance of a simple plane surface moving perpendicularly to its surface in water at rest is only two-thirds of the resistance of the same surface, all things being equal, when it is exposed to the direct shock of this fluid in movement.'"

The case here is, clearly, on one side we have M. Sée, who certainly appears rather "cock-sure" that his theory *must* be right, and so Colonel Duchemin's experiments—or even the *necessity* for them—are absurd. On the other side, Duchemin has doubts about this theory—or, in any case, wants experimental confirmation of it—and finds by experiment that the resistances are *not the same*. Are we to believe the theorist or the experimentalist?

Without attaching any importance to the figure *two-thirds*, which may have been correct in Duchemin's experiments, but which might not hold good for all cases, I think the experimenter was right and the theorist wrong. To make the cases properly *reversible* it would be necessary to move the liquid *and its enclosing vessel* past the plate; and that is why I italicized the words "flowing past" in my quotation from your paper. I will explain what I mean.



Let us imagine A B to represent a longitudinal section of the surface of a liquid flowing in a canal in the direction of the arrow. The slope is purposely exaggerated. Let us next imagine the motion of the water to be *suddenly* stopped—as if it were suddenly frozen, though not solidified. If we then put a boat, or other body C floating in the liquid, it will, obviously, slide down hill and acquire a certain velocity. Next, let the water flow again. It will be, I think, clear that the boat will travel *faster than the stream*; in other words, it will always have some "way" on it. Anyone who will think about this will see that it must be so; and yet it is commonly taught that a body floating in a flowing stream has no "relative" velocity to this stream. More than a century ago Dubuat showed, experimentally, that this was not correct; it is also instructive to watch a barge going down a river; the bargee is always at the helm.

If we next imagine C to be fixed and the stream to flow past it, it is clear that what is commonly called the "velocity head," which is the cause of the differences of pressure on the two sides of the plate, will not be H but H + h; the cases are *not reversible*. Duchemin found in his

experiments that $h = \frac{1}{2}$ H, but his range of experiments was very small.

Yours faithfully,

R. de VILLAMIL,
Lieut.-Col. R.E. (Ret.).

Carlisle Lodge, Rickmansworth, Sept. 11th, 1912.

Before giving a list of a few out of the overwhelming number of eminent authorities who hold the view here opposed, let us examine the arguments put forward by Colonel R. de Villamil in support of his attack on the commonly accepted theory.

"To make the cases properly *reversible*," Colonel de Villamil says, "it would be necessary to move the liquid and its *enclosing vessel* past the plate." This would only be necessary if the sides and bottom of the channel were so close to the body experimented on as to affect its stream-lines. That the remoteness of the sides and bottom from a small model need not be great is borne out by the fact that Dr. Stanton, with a plane 2 square inches in area held steady in a channel 12 inches broad by 7 inches deep, got results which were in close agreement with those Mr. W. Froude obtained when experimenting on a plane 3 ft. broad and 1 (?) ft. deep towed through a tank.

Colonel de Villamil deduces that the boat must move faster than the stream in which it is drifting, from the analogy of the boat on a stream of sloping surface, to that of a body sliding down an inclined plane—the surface of the water—which in itself is moving in the direction of its length. This "sliding," he says, is the cause of the boat moving faster than the water.

Why should gravity have more effect on the boat than on the water of equal weight which would occupy the cavity vacated were the boat removed? It would be just as reasonable to expect the equivalent mass of water to move quicker than that surrounding it, as to expect the boat to have a motion relative to the water in which it is immersed.

Pollard and Dudebout in their "Théorie du Navire," and Durand in his "Resistance and propulsion of ships," state that the discrepancy in Dubuat's results must have been due to his measurement of current velocity being taken at a point in the orthogonal section at which the velocity was not that of the water which actually impinged on the plane. Another assigned reason being the turbulence of the stream, which is obviated when the plane is moved through the water.

Among others who have spoken in support of the "reversibility," may be mentioned Professor Perry, Dr. R. E. Froude, Sir John Thornycroft, C. E. Stromeyer, Professor J. J. Welch and Dr. Stanton. The fact may also be mentioned that in the National Physical Laboratory, in addition to the towing tank, a large sectional tank on the stationary model basis has been laid down.—Ed. "M.E. & N.A."

REVIEWS.

Fighting Ships. 1912 Fred T. Jane. London: Sampson, Low, Marston and Co., Ltd. 15th year of issue. 21s. nett. This invaluable naval annual, now in its 15th year of issue, appears somewhat later than usual owing to the delay involved by official corrections, nearly all the navies being now revised by the order of the Minister of Marine or semi-officially checked. This has resulted in the elimination of plans of most of the newest designs, such vessels as the *Kongo, Rio de Janeiro, Admiral Cochrane, Queen Mary*, etc., being still regarded as "officially secret." To this extent the book suffers somewhat, as where information has been obtained and might otherwise have been made use of, it is withheld in deference to official request. On the other hand, the host of minor corrections in armament, dimensions and other data which have been made more than atone for the absence of what might be more or less speculative plans of new ships. An immense number of new photos have been included, and several ships are now illustrated by a couple of views—an admirable system, as a three-quarter bow view often masks interesting details shown by the stern photographs. The practice could be made more general with advantage. The plans and silhouettes show the thoroughness and desire for accuracy characteristic of the work, and a great many of the latter have been redrawn—we noticed the *Indefatigable, Olympic, Danton* and *Imp. Pavel* amongst others which have had minor corrections made to them. In England, the funnel markings are now given for all ships, including destroyers, and new photos include *Hercules*, with raised fore funnel and bridge extensions, *Lion, Active*, most of the "Acheron" class—the destroyer pages are becoming a perfect picture gallery now—and additional views of the pre-Dreadnoughts. The German pages include some particulars of the new capital ships, photos of the *Kaiser, Moltke, Magdeburg* and new destroyers. Most ships have small additional sectional views in addition. Owing to there being no secrecy embargo in the U.S.A. over details of new construction, the official pictures of all ships now building are given ("Oklahoma," "Texas" and "Arkansas" classes), and a large number of photos show the pre-Dreadnoughts with their full complement of lattice-work masts. The Japanese pages show many alterations and additions, range-control tops, and removal of masts in some of the small cruisers having demanded fresh views. The *Akashi* and *Suma* have now only a foremast. Other interesting photos are the *Dante Alighieri, Pavel, Gromboi* with new rig, the Argentine destroyers and *Uruguay*. Nor must the ever-increasing columns of subsidiary ships and auxiliaries pass without mention. The U.S. authorities have been particularly extravagant in this respect and have included some seventy-eight views of non-fighting craft, all of which are, however, of interest.

Part II. (by Mr. Chas. de Grave Sells) consists of a very full and accurate review of the progress of warship engineering during the past year, extending over forty pages, well illustrated with photos and drawings. Turbines, screw erosion, superheating, indicators, anti-rolling tanks, machine tools, motor ships and internal combustion engines all come in for review in a particularly concise yet exhaustive manner. The "Invulnerable" battleship of the future, outlined by Col. Cuniberti, of the Royal Italian Navy in Part III., is worthy of the same consideration as his earlier projects; it must be remembered that it was he who first outlined the *Dreadnought* in his 1903 F.S. article on an "Ideal British Battleship."

Reed's Guide to the Use of the Slide Valve. By W. H. Thorn and Son, Sunderland. Thos. Reed & Co., Ltd. 4s. nett. 1912.

The importance of the slide valve problem to an engineer, if he must know his business, is without question. It is the very basis of the steam action in the cylinder and the true setting makes for economy and is what the indicator diagram discloses if faulty. Most treatises on the subject are elaborate, too mathematical for the average intellect, and the authors are desirous in the present work of remedying this state of things. Only a little perusal serves to show how well they have succeeded in their endeavours. There are illustrations closely interspersed throughout the pages, but they are of a simple character and designed to explain away the difficulties that must attend on this abstruse question when being studied by a novice. To do this it is at first necessary to have sections of a valve to show the steam admission and exhaust, and also what "lead" and "lap" mean. The methods of driving are next traced out as far as is required and the effects of "lead" and "lap" described with the "cushioning" that follows and the need for this. No book on the slide valve is possible without reference to valve diagrams, as it is by these means the valves are designed in the drawing office, and there we expect to find the well-known Zenner method discussed. We may say at once it is treated in the simplest manner possible and with a minimum of application the student should be able to master all that is found here. The effect of the angularity of the rods is also shown, and having thus given the general principles of the subject the reader is led on to consider other than the simple forms of valve, to reduce travel and friction, which in marine practice, from the largeness of the sizes employed, becomes very necessary. Then again, there are such special details of the slide valve as balance pistons, which, as the name implies, balance their weight. Link motion naturally receives notice in connection with slide valves as being the simplest and oldest form of reversing, but the effects on "lap" and "lead" in the various positions is what the authors make clear as regards the slide valve distribution of steam to the cylinders. Patent gears such as Bremme's, Hackworth's and Joy's are illustrated and explained fully. To complete

the subject, however, it is necessary to go into the question of expansion, which brings in the supplementary valve for this purpose, and with a chapter devoted to the important matters of setting of the valve and another containing questions and answers we come to the end of what is undoubtedly a work of much importance and founded on a moderate compass, every detail being embodied and with the reason for its use clearly stated. For examination purposes there is apparently nothing wanting here, while for the general reader the same may also be said with truth.

Modern Sanitary Engineering. By Gilbert Thomson, M.A., F.R.S.E., M.Inst.C.E. London: Messrs. Constable and Co., Ltd. Price 6/- nett.

The author of this work is the Lecturer on Sanitary Engineering in the Royal Technical College of Glasgow, and in this capacity, and as a civil engineer, is in an excellent position to deal with the engineering problems involved in the collection, conveyance and disposal of sewage as apart from the details of execution of work as is set forth so fully in many books written from the tradesman's point of view. The present volume is Part I. of the work, and is devoted to house drainage. The principles laid down are from a sanitary standpoint, applicable to any system of drainage, wherever situated, and the reader will be well repaid in a study of the subject from this work. What may be termed the dynamics of drainage are dealt with in a very clear and comprehensive manner, and no difficulty need be experienced in arriving at a conclusion as to the way not to carry ont a job.

ELECTRIC PROPULSION OF SHIPS.

By Henry A. Mavor.

In a paper on "Marine Propulsion by Electric Transmission," the author gave a description of the machinery installed in the *Cyclops*, *Neptune* and *Jupiter*, three colliers of about 20,000 tons displacement, which are being equipped by the United States Government respectively with reciprocating engines, two steam turbines connected to the propellers by mechanical gearing, and a steam turbine connected to the propellers by electric transmission. Mr. Mavor also gave details of an oil-electric tank barge now being constructed in this country to designs prepared by himself and Mr. John Reid, of Glasgow, for service on the Canadian lakes, to be named the *Tynemount*. The equipment, which is based largely on that of the *Electric Arc*, described by him in his paper read before the Association last year, consists of two units, each comprising an engine, dynamo and a propeller motor. The engines work on the Diesel four-cycle principle and have 12-in. cylinders with a 13½-in. stroke working at 400 r.p.m. Each has six cylinders, and the cranks are so arranged that the firing takes place at equal intervals. The electric equipment includes two three-phase generators each giving about 235 k.v.a. at 500 volts and 20 or 26·6 cycles. A single three-phase motor developing 500 b.h.p. is coupled direct to each of the propeller shafts.

The National Time Recorder Co., of Blackfriars Road, London have recently issued a nicely-printed and illustrated catalogue of their British-made time recorders. These recorders are well known, and their construction and special features are set out in the catalogue.

Notice to Mariners—Since the 17th of August, a submarine ground bell has been established in position 1 mile 2¾ cables South, or 180° True (South 16° W. Magnetic) from the Lizard lighthouse. In thick or foggy weather the bell will give four strokes in quick succession, followed by a silent interval of 30 seconds.

FUELS FOR INTERNAL COMBUSTION ENGINES.

To engineers who have been watching the trend of events, it must be evident that internal combustion engines for ship propulsion are slowly making an entry into that field so long held by the reciprocating engine. The turbine was the first rival to appear, and while it almost immediately replaced the reciprocating engine for war vessels and steamers where high speeds were demanded, it did not make and has not made perceptible headway for the propulsion of slow-speed cargo vessels. The oil engine has now definitely entered into competition with the steam engine, not only for high-speed boats, but also in the type of steamer in which it was believed the reciprocating engine need fear no rival for many years to come. Already several cargo vessels have been working, with internal combustion engines for some time, and several others are about to begin work. It is unnecessary to give the names of these vessels, as readers will be familiar with them.

In "The Glasgow Herald" of recent date, a correspondent, writing on this subject, drew attention to the fact that although this country was making up on others which have taken the lead, it was possible that we were following lines of development, which, while leading in the right direction, might not be, and probably were not the best lines for this country. The argument followed was, that in many of the countries where great strides had been taken in the application of oil engines to ship propulsion, oil was easily obtainable in large quantities at a low price; we, on the contrary, had no oil wells and a very limited production of oil from shale; coal again was plentiful, and obtainable in large quantities at cheap prices practically everywhere throughout the country. He also drew attention to the fact that engineers had become so engrossed with the idea of oil engines and the economy of working them, that they had overlooked the fact that, on land, oil engines are rarely considered as prime movers, except in very small units, where it is possible to use suction gas engines.

It has been proved over and over again, that suction gas is not only more economical to run, but that it is much cleaner. It will be interesting to consider the fuels which are most generally obtainable for use in internal combustion engines. Petrol costs about 9d. to 1s. per gallon, and is very dangerous, so that on these two points it is never used for commercial work, except under exceptional circumstances. Paraffin oil or petroleum is safe, but except for small engines it also is too costly. Fuel oil or residue is the only oil-fuel at present worthy of consideration for use in engines of any size. This fuel has a specific gravity of ·86 to ·93 and has a flash point of from 200° to 270°F. The cost of this oil in bulk is about 2d. to 3d. per gallon, on an average.

Taking suction gas as the competitor to fuel oil, it may be well to state that anthracite, coke and charcoal are all suitable for use in the producer. Anthracite has many advantages over the others; in this country it is not so cheap as coke, but it is cleaner; it is a fuel which gives a lower consumption than coke; charcoal is far too expensive to use here. From the above statement it is clear that anthracite is the most suitable of the three, and anthracite alone will be considered hereafter as fuel when comparing oil and suction gas. The size used should be ⅜-in. to ½-in., and as the price varies considerably, due to the district from which it is produced, some districts giving a much better anthracite than others, and due to the distance from the source of production to the point of consumption, the price per ton is taken as ranging from 17s. to 23s. Bituminous producers are on the market, but so far as the author is aware, the number at sea is very limited, and no figures of recent date are available to compare the cost of working against the ordinary suction gas plant using anthracite or coke.

The usual method of comparison, with engineers, of the cost of running various engines, is so much coal or oil per H.P. per hour. The cost of running one horse-power for one hour gives such extremely small fractions of a penny that it is almost impossible to grasp the meaning of what the difference really is, consequently it might be as well to fix upon some larger unit than one H.P. hour, and it is

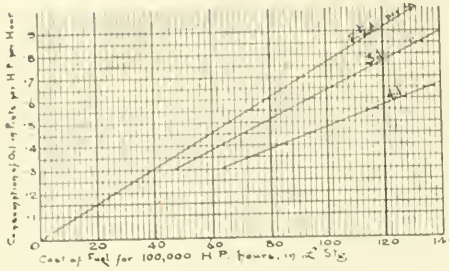


Diagram I.

proposed to take 100,000 H.P. hours, so that the true significance of the figures will be apparent. 100,000 H.P. hours may mean one H.P. for 100,000 hours, 100,000 H.P. for one hour, or any combination of H.P. and hours, so long as the result of multiplying the H.P. and the hours together give 100,000. Diagram I. gives the cost of fuel, for 100,000 H.P. hours, the oil used costing 2½d. per gallon and 3d. per gallon, for an engine having any consumption up to ·9 of a pint of oil per H.P. per hour. Diagram II. gives the cost of the fuel for running 100,000 H.P. hours using anthracite, in a suction gas producer the fuel costing from 17s. to 23s. per ton, and the fuel consumption being 1¼ lbs. of anthracite per H.P. per hour. This consumption is that which is guaranteed by most makers of suction gas plant. There is another line on Diagram II. marked 1 lb.; it is put on for the reason that it more nearly approximates to the actual consumption which is obtained in practice, as will be seen later on from some actual examples of plants which are in successful operation. The two diagrams disclose a very interesting state of things. Taking into account only the cost of fuel, it is seen that with the low consumption of oil of ·5 of a pint or ·43 lbs. per H.P. per hour for 100,000 H.P. hours and taking the cost at the low figure of 2½d. per gallon and comparing it with the high consumption of 1·25 lbs. of anthracite per H.P. per hour, for 100,000 H.P. hours, it is always cheaper to use anthracite until the cost per ton rises above 23s. 3d.; or, if anthracite be taken as the standard, knowing the price per ton, Diagram III. will give the equivalent price of the oil which must be used. Briefly, the diagrams are used thus:—Diagram I.—From the vertical column giving the consumption of oil per H.P. per hour, read in a horizontal direction until the sloping line is reached, marked 2½d. or 3d., depending on the price of the oil; vertically under that point is the price for 100,000 H.P. hours. Diagram II.—Again on the left there is the price of the fuel, anthracite, in shillings per ton, and reading to the right until the line

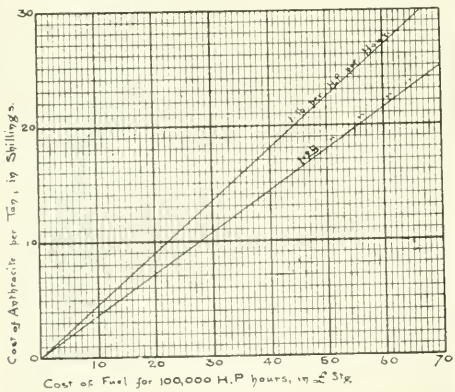


Diagram II.

marked 1 lb. or 1¼ lbs., as may be thought most suitable, is reached, vertically under this point is the cost for 100,000 H.P. hours. Diagram III.—Take the cost of anthracite at, say, 20s. per ton, and read along to the right until the sloping line marked 1¼ lbs. is intersected, follow this point of intersection vertically down until this line cuts the sloping line of consumption, corresponding to the consumption of oil in pints, of the engine, then read to the left and the equivalent price of oil per gallon will be found, and to the right the cost per ton. Thus for anthracite at 20s. per ton with a consumption of 1¼ lbs. per H.P. per hour, an engine using ·9 of a pint of oil per H.P. per hour would require to use oil costing 1·2d. per gallon; if the consumption were ·5 of a pint of oil per H.P. per hour, the oil would require to cost 2·2d. per gallon to give the same fuel cost as a similar engine using suction gas.

Among the prominent makers of internal combustion engines successfully using petrol, paraffin and other heavy oils, who have also had a number of engines working on suction gas without any trouble, the Wolverine Motor Works, of Bridgeport, Conn., U.S.A., take a foremost place. The

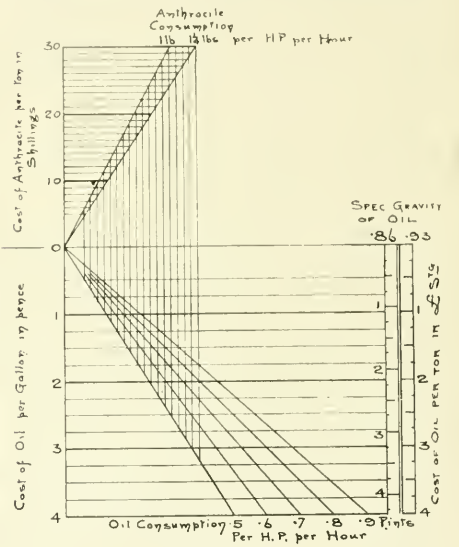
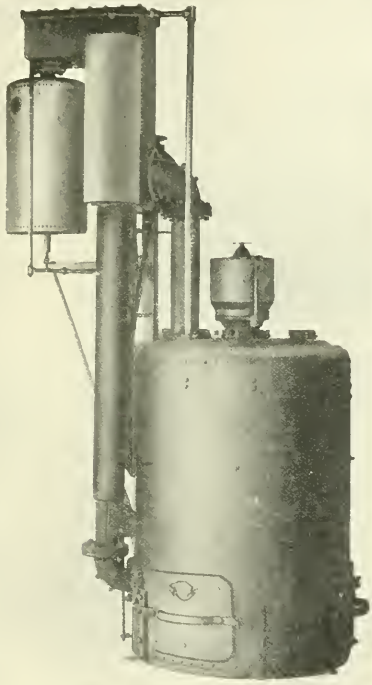

Anthracite Consumption
1lb 1¼lbs per H.P per Hour
Cost of Anthracite per Ton in Shillings
Spec Gravity of Oil
·86 ·93
Cost of Oil per Gallon in pence
Cost of Oil per Ton in £'s
Oil Consumption ·5 ·6 ·7 ·8 ·9 Pints Per H.P. per Hour

Diagram III.

"Wolverine" engine, which is of the slow-speed, heavy duty type, is built on the four-stroke cycle, and is remarkable for the large bore of the cylinders, combined with an exceptionally long stroke; it has the reversing gear and thrust block carried on a frame, which is bolted to the engine frame; this keeps the gear in perfect alignment. The ignition is low tension electric ignition, and is variable. The ignition timing lever is also connected to the throttle valve, so that the point of ignition is always that which is most suitable for the amount of fuel used; as the speed of the engine depends on the fuel consumed, the firing is always at the point which gives maximum efficiency with a minimum consumption of fuel. The "Wolverine" engine has been used in Belgium on the canals for tugs and freight boats; at the same time it would be difficult to find a country where motor-boats are used without coming across a "Wolverine." It is Belgium in particular that we shall look to for the purpose of obtaining recent information on the working of marine suction gas plant. Surely there is something wrong somewhere when Great Britain has to turn continually to foreign countries in this particular branch of engineering.

There are four tugs belonging to a firm in Ghent. No. I. fitted with a 27 H.P. motor, Nos. II. and III. fitted each

with a 36 H.P. motor, No. IV., which is 50 ft. long, 11 ft. 3 in. beam, and 5 ft. 3 in. draught, is fitted with a 75 H.P. motor and suction gas plant. The first three engines mentioned are the "Wolverine" standard oil engines, which operate upon petrol or paraffin. When using the latter fuel, it is necessary to start on petrol for a few minutes and then switch over to the heavier fuel. This method is adopted in the "Wolverine" engine when using heavy oils. The suction gas motor has some slight alteration made from the standard motor to suit the different nature of the fuel, *viz.*, gas instead of oil. This boat, *Wolverine IV.*, is used as a tug, often towing four barges, each carrying 300 tons. The consumption for the twenty-four hours, which is made up of ten to twelve hours working day and fourteen to twelve hours stand by,



40 H.P. Galusha Marine Gas Producer

amounts to 300 to 320 kilos. (660 to 700 lbs.) of anthracite. This anthracite costs 22 francs per 1,000 kilos, and taking the value of a franc as 9¾d., this amounts to 17s. 6d. for 2,200 lbs. This works out at a consumption of ·783 lbs. per H.P. per hour, making the cost ·075d. per H.P. per hour. Another boat, called the *Zeemeeuw III.*, is fitted with a 36 H.P. motor and suction gas plant. She is 115 ft. long by 16 ft. 5 in. beam, 6 ft. 3 in. draught, and carries about 200 tons. The consumption of fuel per twenty-four hours, consisting of a twelve-hour run and twelve hours stand by, is 190 to 200 kilos. (420 to 440 lbs.) of anthracite. Taking anthracite at the same cost as previously given the consumption is 1·02 lbs. per H.P. per hour, making the cost ·098d. per H.P. per hour. *Zeemeeuw III.* has been so successful that, after ten months' working, the owner, who has another boat fitted with a 36 H.P. "Wolverine" working on oil fuel,

Zeemeeuw III.

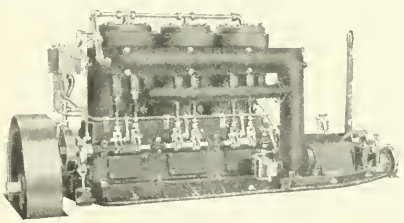
Length 115 ft., Beam 16 ft. 5 ins., fitted with a 40 H.P Galusha Marine Gas Producer.
Speed, with 150 tons of freight, 7½ miles per hour.

decided to put in and has installed a gas producer and altered the engine to use gas, at the same time lengthened his boat to carry more cargo. Equally satisfactory results are anticipated from this boat. The producer in these three boats is built by Messrs. A. L. Galusha & Co., Dorchester Center, Mass., U.S.A.

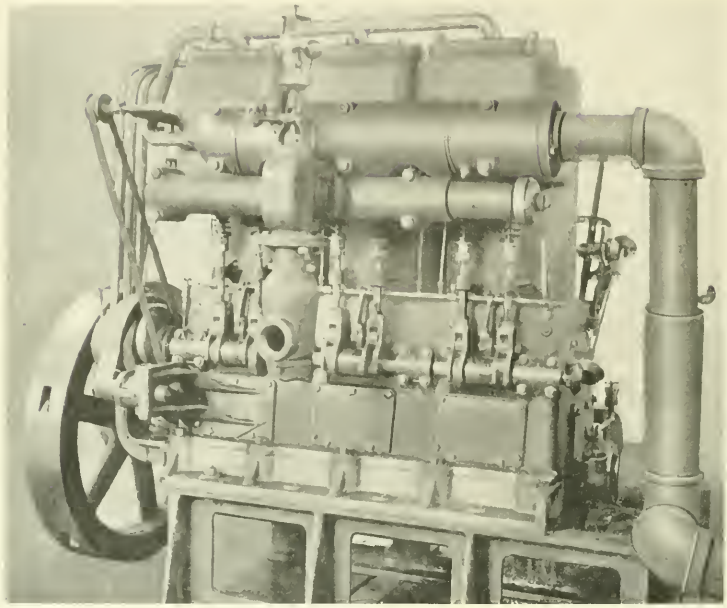
The Wolverine Motor Works have recently completed a suction gas installation in a boat working in Florida. Previously to the change from oil, this engine, which is of 75 H.P., used £13 10s. worth of fuel on the trip from Miami, Florida, to Key West; since the change the fuel bill amounts to only £2, or a saving of £11 10s. per trip.

Among the number of boats in this country which have been fitted to run on gas, may be mentioned a canal barge belonging to Messrs. Fellows, Morton & Clayton. This barge is fitted with a Crossley Bros.' suction gas plant and a 14 H.P. engine. The engine was fitted to start with compressed air. Messrs. Thornycroft fitted a barge 72 ft. long by 7 ft. beam with a suction gas producer and 35 H.P. engine. This barge ran on the canals in the Midlands and South of England demonstrating the suitability of this fuel. H.M.S. *Rattler* was fitted by Messrs. Beardmore with a gas plant and engine. This boat was used by the Clyde Naval Volunteers as a training ship. *Pioneer*, a 40-ft. cabin cruiser yacht, was installed by her builders, Messrs. McLaren Bros., Dumbarton, with a 30 H.P. Crossley Bros.' engine and suction gas plant. Messrs. McLaren Bros. also fitted a Crossley Bros.' engine and suction gas plant in the *Electric Arc*. In this case the engine did not drive the propeller direct, but generated electricity, which was used to propel the boat on the "Mavor" electrical propulsion system.

Holzapfel I. is perhaps the most interesting, as it is the latest installation. The ship is 120 ft. long by 22 ft. beam, and 11 ft. 6 in. moulded depth; 350 tons is her deadweight carrying capacity, and the builders were Messrs. I. T. Eltringham & Co., South Shields. The engines, which were manufactured by Messrs. E. S. Hindley & Sons, Bourton, Dorset, are one set of six cylinders, 10¾ in. diameter by 10 in. stroke, which develop 180 brake horse power. The revolutions are 400 per minute, and the normal power is stated to be 156 H.P. This engine does not drive the propeller direct, but through the medium of Prof. Föttinger's hydraulic power transformer,



3-Cylinder Wolverine Oil Engine.



75 H.P. Wolverine Suction Gas Engine.

which is also the reversing gear. The gas plant was manufactured by the Power Gas Corporation, Stockton-on-Tees. This plant is constructed to use bituminous fuel and seems to be very economical, the consumption being given as ranging between ·75 to ·98 lbs. per H.P. per hour.

There must be numerous openings for gas plants in boats in this country, once owners of tugs and coasters grasp the fact that large dividends may be earned with apparatus which has long passed out of the experimental stage and entered the region of commerce. If this method of working has been successful in other countries, there is no reason to prevent it being equally successful here.

Another type of boat which should show good returns by adopting this fuel is the canal barge. Taking the price of anthracite at 20s. per ton and 1¼ lbs. of anthracite per H.P. per hour, the cost would be ·134d. per hour. Take the case of a canal barge 70 ft. long by 7 ft. beam, draught 3 ft. 6 in., and about 44 tons displacement, which will carry about 30 tons deadweight; fitted with a 10 to 12 H.P. motor, this barge should attain a speed of 4½ to 5½ miles per hour. The fuel consumption cost, at ·7 pints of oil per H.P. per hour, oil costing say 5d. per gallon, would be 4·37d. to 5·25d. per hour. Now with suction gas the cost would be 1·34d. to 1·6d., a saving of rather more than 3d. to 3¾d. per hour. Some may object to the oil engine consumption being rated so high; but it must be remembered that the motor is probably in the hands of one who is not an expert, and that consequently the oil consumption will be high. Taking the consumption at ·6 of a pint of oil per H.P. per hour, the total cost per hour would be 3¾d., or an increase of 2¼d. per hour over suction gas. As the boat has a speed of about four miles per hour, and suppose an average day's run, including stops, will be equal to nine hours continuous running without any hindrance, the saving will be 2s. 7½d. to 1s. 10½d. Take the working days of the above boat to be 300 per year, but that with loading and unloading she is only journeying for three-quarters of that time, then there will be a saving of £21 to £29 per year.

The cost of the producer is low; probably for 10 to 12 H.P. it would cost from £90 to £110, and the weight would be about 1,500 lbs., or say 13½ cwts. It makes for cleanliness, as oil, even in the best installations, leaks and saturates any woodwork, whereas with suction gas the dirt is in the form of dust, very little at that, and may be easily removed. The labour of firing is very little, only requiring to be done every four to six hours. When the engine stops the making of gas stops also, and during stand-by time, under banked fires, the consumption of coal is so little as to be negligible. As will be seen from the foregoing figures there is sufficient to repay the cost of the producer in four to five years, and owing to the conservative method of calculating out the consumption, and in view of the saving obtained in other trades, it is almost safe to prophesy that better results would be obtained. It is in the larger sizes that greater savings are to be looked for. Take the case of a coaster with 200 H.P., oil at 2½d. per gallon and using ·6 of a pint per H.P. per hour, the other similar boat using suction gas from anthracite at 20s. per ton. Fifty weeks a year, six days a week and fifteen hours (average) per day, make 900,000 H.P. hours per year, so that the cost for the oil-driven boat is £703 2s. 6d., and the gas-driven boat's fuel bill is £502 10s., or a saving of £200 fully. In three years this saving would have more than paid the cost of the producers.

SAFETY LOCKS FOR AUTOMATIC LIFTS

IT appears desirable to place in the hands of lift owners and users some reassurance as to the possibility of making a genuine "Safety Lock."

Messrs. Smith, Major & Stevens, Ltd., of Abbey Works, Northampton, have introduced a lock avoiding the defects of those commonly in use, and which has in practice proved itself actually capable of making the lift safe, except against wilful and intentional mischief. Its predecessors obtain all their motions from the act of closing the door or gate. The new lock obtains them independently. Three things have to be done, *viz.*, shut the door or gate; latch it; give current to the machine. The faults of the old system all arise from the futile attempt to make these three things occur simultaneously. If the switch happens to be closed first, the machine can start with an unsecured gate, the contingency which has given rise to the largest number of accidents. Messrs. Smith, Major & Stevens, Ltd., have successfully removed this and other dangers by inventing a lock which performs the three requisite functions in a definite and ordered sequence. In their patent lock the door or gate must first be completely closed. Till that is done, nothing more can be effected. Next follows the latching of the door, and until that is securely done it is impossible to give current to the machine. Finally current is given. On opening the door the current is first cut off, then only can the gate be unlatched, and finally opened. By some recent improvements the general principle described above has been farther strengthened against wilful interference by mischievous persons.

If the proper system is adopted the "Safety Lock" will still prove worthy of its name.

Industrial and Trade Notes.

THE CLYDE AND SCOTLAND.

(From our Own Correspondent).

THE present condition of things as regards work on hand in Clyde shipyards and engine shops is eminently satisfactory. All the yards are practically full up with orders for tonnage—mostly of a high-class character, involving employment for all classes of artizans—and the work is well distributed over the different districts. The labour outlook, however, is, unfortunately, not by any means bright, and it is feared that troubles are impending. The members of the Boilermaker's Society are voting on the question of a strike in order to enforce the advance of 4 per cent. on riveting piece-work rates which has been refused them by the Employer's Federation, and if, as seems probable, the ballot is in favour of a strike, it is difficult to see how a stoppage of work can be avoided. With what at the time of writing looks like a record eight months' output and with abundance of work on hand, it is most regrettable that labour troubles threaten to rob 1912 of its legitimate eminence in the tale of Clydeside industry.

Messrs. Barclay, Curle & Co., Whiteinch, on September 12th, launched the new twin-screw mail and passenger steamer *Neuralia*. This vessel is the first of two sister ships which Messrs. Barclay, Curle & Co. are building for the British India Company. In addition, they have on hand four other liners—either laid down or to lay down—for the same owners.

Messrs. Yarrow & Co., Scotstoun, whose specialities in high-speed craft for naval and other purposes are more and more familiar objects in Clyde shipbuilding circles, especially as concerned with the arena of speed and manœuvring performances, have again been well to the front during the period since the notes were prepared for last issue. On September 7th, they launched for the British Admiralty the torpedo-boat destroyer *Oak*, which is the third vessel of the "Firedrake" type, built and largely designed by the firm. The *Firedrake*, the first vessel of the class, was handed over to the Admiralty on Friday, September 6th, and immediately thereafter left the Clyde for Devonport. On September 13th, the second of the trinity of these special destroyers of the "Firedrake" type, *i.e.*, H.M.S. *Lurcher*, had a most successful full-speed trial on the Skelmorlie deep-water measured mile. During a continuous run of eight hours she attained a mean speed of 35·34 knots, thus exceeding the contract speed of 32 knots by 3·34 knots. The vessel, like the others of this special class, is 255 feet long and 25 feet 7 inches beam. She is propelled by Parsons turbines, driving two shafts, steam being supplied by three Yarrow water-tube boilers fitted with the firm's latest feed-heating devices. It may be recalled that the three special vessels of the "Firedrake" type were ordered from Messrs. Yarrow when Admiral Sir John Jellicoe was Controller of the Navy. The high speed attained by the *Lurcher* shows that that vessel is one of the fastest destroyers yet built. As it would seem, however, that the aim of the Scotstoun firm in producing these vessels is "to go one better" with each successive addition, it is just possible that the *Oak*, recently launched, will fulfil the sequence of events, and be even more speedy than her predecessors.

Messrs. Scott's Shipbuilding and Engineering Co., Greenock, who about the end of April launched H.M.S. *Maidstone*, the depôt ship for submarines, have at the moment of writing berthed the vessel, which is the first vessel of her type, in No. 3 Graving Dock, at Glasgow, for the purpose of hull cleaning. She is now practically ready for commission, and may be described as floating barracks, workshop and store. The vessel, which in general equipment resembles a cruiser, is 320 feet in length, and has a load displacement of 3,600 tons. Messrs. Scott's Shipbuilding and Engineering Company, it may be added, has acquired the premises in Baker Street and Ingleston Street, situated to the rear of the Company's engineering workshops, which were formerly occupied by the British Aluminium Company.

Messrs. Caird & Co., Ltd., Greenock, have been instructed by the P. & O. Company to build and engine two additional steamers of the "N" class for that Company's extensive fleet. Two others, it is understood, are to be built by Messrs. Cammell, Laird & Co. (Ltd.), Birkenhead. The vessels are to be 14½ knot twin-screw steamers of nearly 9,000 tons gross. Those which Messrs. Cammell, Laird are to build will be the first they have done for this well-known line, but at Greenock, as is well known, P. & O. ships have been produced in large numbers, and at the present time it is believed that Messrs. Caird have on hand no fewer than eight.

The Clyde Shipbuilding and Engineering Co., Port Glasgow, have now put on trial, with success, the new oil motor ship *Fordonian*, which they have built and engined for service on the Canadian Lakes. She is the second large cargo carrier built on the Clyde to be propelled by motor, the first being the *Jutlandia*, built by Messrs. Barclay, Curle & Co., Whiteinch.

Messrs. Thomas Shanks & Co., Union Iron Works, Johnstone, the well-known firm of machine tool makers for engineering, shipbuilding, and steel works equipment, have just completed a huge turning lathe, weighing 270 tons, for the firm of Messrs. John Brown & Sons, Sheffield. It is specially designed to deal with large ingots which will be used for the motors of the turbines of battleships, and is being sent from Johnstone in parts. The lathe is the biggest and heaviest of its type. A larger one of another type, made by the Johnstone firm four years ago, is in use at Messrs. Brown's works at Clydebank, but it is not so heavy as the latest production. Messrs. Shanks have received an order for a more massive lathe than those already constructed by them. It is for the Japanese dockyards.

The Ardrossan Shipbuilding Company has been commissioned by Mr. A. M. Gordon, Glasgow, acting on behalf of Aberdeen owners, to build a coasting vessel of similar dimensions and design to the two which are being built at present by Messrs. Hall, Russell & Co., Aberdeen.

Messrs. Mackie & Thomson, Govan, have now sent to the Town Council and Harbour Trust of Irvine, on the Ayrshire coast, official confirmation of their decision to transfer their shipbuilding works to that port, following upon the purchase of the site of their present works by Messrs. Harland & Wolff, Ltd. As the result of all the negotiations, the Irvine Harbour Trust have resolved to dredge the river from the east end of the harbour wharf to the shipyard and maintain the necessary depths from time to time, while the Town Council have agreed to give a sum of £12,500 in lieu of laying out the whole shipyard to suit the new tenants. The latter have offered the Corporation an annual rent, heritably secured, as a first charge over the ground and buildings to be erected by them of £120 per annum, redeemable at any time at twenty years' purchase. It is understood that provision will be made for turning out vessels of from 350 ft. to 400 ft. in length, and that a new patent shipway, capable of dealing with vessels of 300 ft. in length, and equipped with the most modern facilities for ship repairing and overhaul, will be laid down. The firm expect to employ between 500 and 700 workmen, with a wages expenditure of about £50,000 per annum. Preparations will be made for laying out the new yard without delay.

Messrs. Douglas, Primrose & Co., Glasgow, are supplying an emergency petrol-engined electric light equipment for Niagria, which is at present being completed by the builders, Messrs. John Brown & Co., Clydebank, for the Union Steamship Company, of New Zealand. The apparatus, which is being installed on the upper deck, will be sufficiently powerful to keep the lights, as well as the wireless installation going, if the main engine-room should be flooded.

Loch Long Torpedo Range.—The work of testing the torpedoes turned out by the factory at Greenock is expected to begin very shortly at the torpedo range in Loch Long, which is now thoroughly completed. A detachment of thirty experts from the South of England have taken up their quarters in the houses provided by the Admiralty on the west shore of the loch.

TYNESIDE AND WEARSIDE.

Tyneside.

THE shipbuilding industry continues in a flourishing condition on the Tyne, in fact there is a shortage of labour in a few of the yards, causing delay in delivery. Messrs. Armstrong, Whitworth & Co., Ltd., still continue

to be very busy at both the Elswick and Walker yards. Besides battleships for the British and Foreign Governments, they have cargo and oilships building. The firm are about to lose the services of Mr. G. J. Carter, for many years manager of the Elswick shipyard, who has resigned this position to take a seat on the board of Messrs. Cammell, Laird & Co., and will be managing director of their shipyard at Birkenhead.

Messrs. Swan, Hunter & Wigham Richardson, Ltd., have just sent to sea a large pontoon dock which is for service at Lagos. They have secured the contract for a new steamer for the Canadian Government for hydrographic service. This vessel is to be built on exceptionally strong lines, so as to stand ice pressure, and in its equipment will be two gasolene launches, and a lot of instruments for the use of members of the Canadian Hydrographic Commission. The vessel will also be fitted with elaborate ventilating and heating installations, for use in hot or cold climates.

Messrs. Palmer's Shipbuilding and Iron Co., Ltd. continue to be very busy. Besides the battleship *Queen Mary*, they are building two torpedo-boat destroyers for the British Admiralty. They are also building cargo boats, both at the Jarrow and Howdon yards.

Messrs. Hawthorn, Leslie & Co. have all their berths occupied, and have work on hand to last them for some months to come.

Messrs. John Readhead & Sons, Ltd., are very busy indeed both in new and repair work in the yard and dry docks, also in the engine shops. They have just sent to sea the s.s. *Yorkmoor* for the Runciman Line. Work has been started in connection with the new graving dock which the firm are making. They have also vessels repairing afloat.

Messrs. Smith's Dock Company, Ltd., have all their docks full, besides a few ships repairing afloat. The firm are also building a large graving dock at North Shields which is nearing completion and is expected to be opened next month.

The Northumberland Shipbuilding Company have plenty of work on hand, all the berths are occupied, and sufficient orders on hand to last them well into next year.

Wearside.

Work still continues to be brisk in the shipbuilding industry on the Wear, all the shipyards and engineering works being fully occupied.

Messrs. William Doxford & Sons, Ltd.—Work is being carried on at full pressure at all the berths and in the engine shops, and they have orders on hand to last them a considerable time. A new type of vessel is being built on the river at Pallion. It is being built as an ordinary type cargo vessel, and it is proposed, when finished, to fit in the holds three complete cylindrical oil tanks, the lower ones built on bearers on the tank tops, but independent of the double-bottom tanks, and above these, and in the centre of same, a third tank. These tanks will be fitted longitudinally throughout the holds, and are entirely independent of the original structure of the vessel, so that if it is desired to make the vessel an ordinary cargo ship again it can easily be done at very little expense. The plans of this vessel and the arrangement of oil tanks have received the approval of the British Corporation Registry, and the vessel is being built to take their highest class.

Messrs. S. P. Austin & Son, Ltd.—Work by this Company has been much impeded owing to the scarcity of material from the rolling mills, but better deliveries are now coming in and the yard will again be very busy. A large collier steamer is being plated and riveted, and will be ready for launching during the latter part of October. The work at the berth on another large collier has just been commenced, the keel and keelson plates being in position; there are preparations also being made for a third collier steamer of fairly large dimensions. Repairing work has been scarce during the last few weeks owing to the vessels being so busily engaged picking up the good freights now existing, and there is little to report about the immediate future.

Messrs. Osbourne, Graham & Co. have all their berths occupied, and have orders on hand to last them well into next year. They are busy on another vessel building on the Monitor patent system and other vessels of the ordinary type.

Messrs. MacColl & Pollock are very busy, working night and day, on engines for vessels building on this river, on the Tyne and at other places.

Messrs. Lindsay, Swan & Hunter, Ltd., are still very busy making marine motors for the British Admiralty, private firms and for foreign countries. They have also secured the contract for the salving of the stranded steamer *Cape Colonna*, which was beached in a sinking condition at South Shields. They have five of their powerful motor centrifugal pumps on board, and expect to get her off at an early date.

THE TEES AND HARTLEPOOLS.

(*From our Own Correspondent.*)

Whitby.

THE International Line Steamship Co. (Messrs. C. Marwood & Co.), Whitby, have sold the s.s. *Phœnicia*, 3,100 gross tons, to Greek owners for about £15,000.

Middlesbrough.

Messrs. Sir Raylton Dixon & Co., Ltd., Cleveland Dockyard, are reported to have secured the contract to build a medium-sized cargo steamer for Liverpool owners.

Messrs. W. Harkess & Co. are busy in all departments. During the month they have secured the contract to build a steamer for a South American firm.

Messrs. Richardsons, Westgarth & Co., Ltd., continue to be very busy in all departments, having a large number of "Nesdrum" boilers to build for land work. They have also secured the order to supply the engine and boilers for a steamer building locally.

Messrs. Smith's Dry Dock Co., Ltd., South Bank, have booked another order for a small coasting steamer, and are very busy in docking and repair work.

Stockton and Thornaby.

Messrs. Craig, Taylor & Co. are reported to have secured the contract to build a medium-sized cargo steamer on the Isherwood principle for local owners.

Messrs. Richardson, Duck & Co. are expecting to secure an order that is in the market for foreign account.

Messrs. R. Ropner & Sons, Ltd., have plenty of work in hand, but nothing new is reported during the month.

Messrs. Blair & Co. are busy in all departments. They have secured the contract to supply the engines and boilers for a cargo steamer building on the Tees and one building on the Wear.

West Hartlepool.

A large number of local-owned steamers have been sold during the month as follows:—Messrs. C. Horsby & Co., the s.s. *Dalmally*, 2,472 gross tons, to foreigners; the Gnathason Steamship Co. (Messrs. T. Appleby & Co.), the s.s. *Ashfield*, 2,320 gross tons, for about £12,000; Messrs. J. Coverdale and Sons the s.s. *Miles Coverdale*, 2,308 gross tons; the Tuckmann Steamship Co., Ltd., the s.s. *Lorle*, 2,086 gross tons, for £17,000; the Imperial Steamship Co. (Messrs. Sivewright, Bacon & Co.), the s.s. *Eastry*, 2,998 gross tons, to Far East owners, through Messrs. C. G. Ashdown & Co. for £14,500; Messrs. Furness, Withy & Co., the s.s. *Bacchus*, 3,078 gross tons, to continental owners, and have bought the s.s. *Watersand*, 507 gross tons, from Scherpvaart en Stunkolen Maatschappij, Rotterdam; and the Norfolk and North American Steamship Co. (Messrs. Furness, Withy & Co.) have sold the *Montauk Point*, 4,822 gross tons, to the Scotia Steamship Co., Glasgow, for about £30,000.

Messrs. W. Gray & Co., Ltd., are very busy at both yards. They have secured an order from Messrs. Pyman Bros., London, for a large cargo steamer, also one for Messrs. Strick & Co.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Ltd., Harbour Dockyard, have just launched the largest steamer built at this yard. All departments are working at full pressure.

The s.s. *Time* and s.s. *Braemont* are still in dock for heavy repairs, both having been ashore and badly damaged. The s.s. *Time* has her keel set up; she was forty-two days ashore.

Hartlepool.

Messrs. The Central Marine Engine Works of Messrs. W. Gray & Co. have the engines and boilers to supply for the steamers recently booked as above.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Middleton Yard, are reported to have secured the order to build a cargo steamer for the Transport Co., (Messrs. Houlder Bros.), Liverpool. They are also busy with repair work.

Messrs. Richardsons, Westgarth & Co., Ltd., have plenty of work in hand, but are somewhat handicapped for want of material. They have booked the contracts to supply the engines and boilers for the cargo steamers to be built by Messrs. Irvine's Shipbuilding and Dry Dock Co. They have also a large amount of condensing plants on hand, all on the Contraflo principle.

THE HUMBER AND DISTRICT.

(From our Own Correspondent.)

Hull and Australia.—As the result of the visit of Mr. Austen Wilson, the trade commissioner for Hull (for Hull to Australia trade), there are good prospects of a direct line of steamers being run subsidized by the States of New South Wales, Victoria and Queensland. Mr. Wilson recently addressed the Farmers' and Settlers' Annual Conference, which has been holding its annual sittings in Sydney.

Retirement of the Wilson Line Marine Superintendent.—Captain F. Jones having been elected an Elder Brother and Warden of the Hull Trinity House, according to custom relinquished his post of marine superintendent of the Wilson Line. Capt. Jones served his apprenticeship as seaman on a Liverpool sailing ship, trading mostly to the Colonies. He joined the Wilson Line as third officer, gradually working his way up to master, and has been in the service of the Company thirty-two years, during eight years of which he has held the position of marine superintendent. He has fulfilled his onerous duties to the entire satisfaction of the Company, and it was with regret the firm had to accept his resignation. On the 5th of September a concert was held in honour of Capt. Jones, a great number of masters and officers attending. Some valuable presentations were made to the retiring superintendent and an enjoyable evening was passed.

New Joint Dock at Hull.—The work of fitting the outer dock gates in their places is to be pushed forward; each half gate is 180 tons, making one set of gates 360 tons. The work is carried out by Mr. Neilson and staff of Messrs. Armstrong & Mitchell, of Newcastle-on-Tyne. There are to be three pairs of gates fitted to the lock pits, and we are informed that it will be twelve months before the water will be let into the docks.

It is rumoured both in Hull and on the Tyne, that Smith's Dry Dock Co. have leased the two graving docks now under construction at the joint dock.

Messrs. Earle's Ltd., engineers and shipbuilders, are very busy and are still successful in booking orders for new steamers. They have just launched the s.s. *Withernsea* for Messrs. Brown & Atkinson, of Hull, and are building a sister ship. Both vessels will be employed in the general cargo-carrying trade only. The firm have also completed two hopper barges of fair steaming power for London owners, and have secured the order from the Wilson Line for the building of two steamers for the Mediterranean and Baltic trade. These vessels will be built to the highest class under the British Corporation survey. They have just laid down the keel for a very large steamer for Austrian owners, and the firm's patent slips have of late been fairly well employed with local and other work. The H.M.S. *Speedy* has been on the slip undergoing repairs, etc.

Messrs. the Central Dry Dock Co., Ltd., still keep to the front as ship repairers, and have had a very busy and satisfactory month. The repairs executed have covered every description of ship and engine repairs, from new stems and keel bars and plates to new mast derricks, and gear for the largest cargo steamers to the small composite steamer. The Company has now an oxy-acetylene plant, which has been of great service in cutting away large damages, especially when expedition is the most important factor. During the month over thirty vessels have been in the firm's hands, some undergoing very extensive repairs.

Messrs. Cooper & Co., Ltd., engineers and ship repairers.—The Neptune Works are keeping fairly busy in all departments, the moulding shop is working at top pressure to complete orders for the firm's own and outside work for different firms. They have also several orders for Cooper's special patent propeller for home and foreign customers. The branch shop at Alexandra Dock is fairly busy with repair work, opening out boilers and engines and refrigerating machinery for Board of Trade and Lloyd's annual surveys. The Company's own graving dock is well employed, and also some very extensive repairs have been executed in ship's bottoms. The firm are keeping well to the front with general repair work.

Thomas Tate, engineers and boilermakers, have had a fairly good month on repairs, etc.; s.s. *Saxon Queen*, engine and deck repairs; tugs *Rover* and *Stanley*, fitting new boiler in each; also new bunker casing, etc., and they have fitted new propellers on three tug steamers.

Messrs. Amos & Smith, Ltd., engineers and boilermakers.—All departments of this firm are fairly busy; they have also secured several sets of boilers and machinery for new trawlers now building for delivery next year; enquiries are numerous for new machinery. The branch shop situated at Alexandra Dock is fully employed in graving dock work, also engine and deck repairs on local and outside steamers. The West Dock outside staff are kept fully employed on repair work, and opening out boilers and machinery for Board of Trade and Lloyd's and British Corporation surveys.

Messrs. C. D. Holmes & Co., Ltd., engineers and boilermakers, have at present in the Queen's and Albert Docks six large steam trawlers, fitting boilers and engines and all auxiliary engines on board. The branch shop on the Alexandra Dock is also well employed and the prospects for October seem good.

Messrs. Stewart & Craig, engineers and ship repairers, have been fairly busy during the month on several steamers, doing deck and engine-room repairs. Enquiries from several owners for graving dock work have come in.

Messrs. the North-East Coast Engineering (Works), Ltd., have had a fair amount of repairs during the month, on the following steamers—s.s. *Kaethe*, s.s. *Langdale*, s.s. *Buxton*, s.s. *Canadia*, s.s. *Goosebridge*, s.s. *Locksley*, s.s. *King*. The s.s. *Kaethe* has been in collision and has had new stem, etc., fitted. Several steamers have gone through very extensive repairs. The tug boats *Chester*, *Winchester* and *Powerful* have had deck and engine repairs done.

Messrs. Woodall & Co., engineers and boilermakers, have been fairly busy during the month on a number of steamers. Several of the steamers have had extensive repairs on deck and in engine rooms. The smithy department of the firm has several contracts for stern posts, stems, etc., for several small shipbuilding yards. The firm are looking forward to an increased output of work and are providing fresh plant to cope with the orders.

Messrs. Cochrane & Sons, shipbuilders, Selby, are very busy and still booking many orders for trawlers, drifters, tug boats and coasters.

Obituary.

A very well-known engineer has passed away in West Hull in the person of Mr. J. G. Hunton, aged sixty-three years. Mr. Hunton, who was a native of Leeds, came to Hull many years ago, and joined the Wilson Line as junior engineer, and after obtaining his certificates, left the sea and became manager of the Goole Shipbuilding and Engineering Co., Ltd., where he remained for several years. He came back to Hull as senior surveyor to the Hull Steam Trawlers Mutual Insurance Protecting Company, Ltd. Mr. Hunton was particularly well known in the trawling fishing circles, having held the above position for over ten years. He was the author of a book entitled "The duties of trawling engineers," and his expert knowledge of engineering matters was highly appreciated on the Fish Dock. The deceased was a member of the De la Pole Lodge of Freemasons. The funeral took place on 13th September, and was attended by the heads of the different firms, superintendent engineers, and many members of the De la Pole lodge of Freemasons.

SOUTH OF ENGLAND AND THE ISLE OF WIGHT.

(From our Own Correspondent.)

Mail Contract.—The contract for the carriage of the South African mails by the Union Castle Mail Line comes into force on October 1st. Local rumour has it that the voyage will be completed in less time than that now occupied, and that only

a few days will elapse between the arrival at Southampton of one steamer and the departure of the next.

The "Olympic."—The itinerary which this vessel was to have carried out during this month and November has been cancelled so that the vessel may undergo extensive structural alterations and she will be "laid up" for a period of about five months. She is scheduled to take up her next sailing on April 2nd 1913. In the meantime the vessels of the White Star American and Atlantic Transport Lines will maintain a bi-weekly service; the sailing days being Wednesday and Saturday. The Trafalgar Dry Dock, which has been lengthened and widened to enable it to be capable of taking vessels of the "Olympic" type, is nearing completion, and it is expected that it will be opened again early in the new year. When it is opened it will be immediately put into service. The lack of this dock has been the cause of the *Olympic's* journey to Belfast to have a new propeller blade fitted and the fact of the dock being closed so long has been the cause of strong comment in local shipping journals.

Messrs. J. I. Thornycroft & Co., Ltd., Woolston Works, Southampton.—H.M. ships *Hardy*, *Paragon*, *Porpoise*, *Unity*, *Victor*, *Darling* and *Dragon*.—Satisfactory progress has been made with these destroyers, and the *Hardy* will be ready for launching early this month. H.M.S. *Sturdy* and *Strenuous*.—The general fitting up of store rooms and accommodation is proceeding on these vessels. Shallow-draught Ferry Steamers.—These vessels are now plated. Diesel-engined Yacht.—Work on this vessel is making good progress. The frames are being turned for a passenger and cargo steamer for Trinidad, also the frames are being riveted for a motor passenger vessel for New Zealand. Work has commenced on a composite cargo and motor vessel for Peru. An order was booked last month for a motor launch for the Belize Estate and Produce Co., Ltd. The timbers are erected complete, and the planking is also nearing completion. The shops have been well occupied with machinery for the vessels under construction and usual general jobs and the repairs department have been busy with troopship, yacht, and Government dockyard work.

Messrs. Day, Summers & Co., Ltd., Northam Ironworks, Southampton.—Good progress has been made during the past month with the tugboat which the firm are building for South America. H.M.S. *Dromedary* and the Trinity House steamer *Mermaid* were up at the yard for overhaul, which has been completed and the vessels sailed. The firm have three sets of floating sheer legs in progress, two of the sets having capacities of 60 tons each and one with a capacity of 130 tons. Both hauling-up ships have been fully occupied with repair work, and last month the firm converted the Peninsular and Oriental s.s. *Somali* from a troopship into a passenger and cargo vessel.

Messrs. J. Samuel White & Co., Ltd., East Cowes.—During last month the first keel plates of the new British destroyers were laid at the above yard. The fire float, which the firm are building for the London County Council, was launched successfully last month. The overhaul of the steam lifeboat *City of Glasgow* has been completed and the vessel has left for her station. Sundry preliminary trial trips have been carried out and the shops generally continue busy. Steam pinnaces for the battleship *Queen Mary* have been delivered to Messrs. Palmer's Shipbuilding Co., Jarrow-on-Tyne.

THE THAMES.

(*From our Own Correspondent.*)

Royal Mail Shares.—There has been a sensational rise in this Company's stock, similar to what occurred before the acquisition of the Union Castle Line of steamers some time ago. Whether in this case any further deals are likely from such a movement only those in the inner circles of the shipping trade can say, but such stock movements are unusual without portending some further developments. Time alone will show what these are.

The Union Line and South Africa.—This Company, under its new management, has not been long in settling the mail contract with South Africa, the terms of which are now made public. A main point is the abolition of rebates. Further, two new steamers will have to be built under the bargain, with four others to follow during the currency of the contract, which is for ten years. The annual subsidy is £171,000, the voyage being 16 days 15 hours. The new vessels will be fitted with triple screws and of 15,000 tons, the fleet to be hired by the Admiralty in case of necessity. The detailed conditions enforced on the Company by the contract appear close and stringent in every way, and apparently in favour of the Government.

Sea-going Training Ship. The four-masted barque *Port Jackson*, with cadets in training, has left Gravesend for Sydney and back. The vessel has a full cargo aboard, the round voyage taking about nine months. All nautical subjects are taught, in addition to work between the decks. The scheme was inaugurated at the suggestion of Lord Brassey in 1890, and many of the cadets so trained hold leading positions aboard the big mail liners. The voyage outward is *via* the Cape of Good Hope, and that home round Cape Horn.

New Thames Tunnel. The latest addition in this direction is to be the tunnel under the river at Woolwich, which is being completed at Woolwich at a cost of £87,000. North Woolwich and South Woolwich will, by the tunnel, be brought into communication, the ferry service being still to be continued. The new facilities will therefore be additional to those existing at present.

MERSEY AND MANCHESTER SHIP CANAL.

(*From our Own Correspondent.*)

THE important event on the Mersey during the past month has been the launch of the super-Dreadnought *Audacious*. Next of importance has been the placing of new tonnage locally by the P. & O. Co.

Messrs. Cammell, Laird & Co.—The 32,000-ton floating dock has passed through preliminary tests and will shortly be put through docking tests at Portsmouth. The first Norwegian steamer is plated and will be launched at an early date, while the second vessel is framed. The South American meat barge *Dart* will be ready for trial about the middle of October. The torpedo-boat destroyer *Garland* is being plated, the machinery being supplied by Messrs. Parsons. An order has been placed with Messrs. Cammell, Laird & Co. for two vessels for the Indian trade of the P. & O. Co. Two similar vessels have been placed with Messrs. Caird & Co., of Greenock. The general dimensions will be—Length 480 ft., breadth 58 ft. and depth 36 ft. 6 in. to upper deck, and she will be of 9,000 gross tonnage. Quadruple-expansion engines driving twin screws will give a sea speed of over 14 knots. Accommodation will be provided for seventy-nine first and sixty-eight second-class passengers. The horse-power will be about 7,000. Since 1911 the P. & O. Co. have ordered no fewer than sixteen steamers which, by the spring of 1914, will give an addition of 156,000 tons. Mr. R. R. Bevis, who for many years has been associated with the firm of Messrs. Cammell, Laird & Co., has retired from the position of managing director. He will retain his seat on the board and his long and valuable experience will be available for consultative purposes. Mr. Bevis is held in high esteem by all connected with the firm and a large circle of friends. Mr. G. S. Carter has resigned the position of manager of the Elswick shipyard to accept the position of managing director of the Birkenhead works. Mr. Carter left Portsmouth to go to Elswick, where he has had charge of some of the most important naval contracts for the British and foreign governments. He is a vice-president of the Shipbuilding Federation, a member of the River Tyne Improvement Commission, also vice-president of the North-East Coast Institution of Engineers and Shipbuilders and other scientific societies, besides being a freeman of the Shipwrights' Company. The repair department have had in hand the *Hyacinthus* and trawler *Hector*, for grounding and collision damage; also the Manchester steamer *Delamere*, which sustained damage to shell and frames in the Canal.

Messrs. H. & C. Grayson.—This old-established firm have once more been responsible for some smart repair work. The *Empress of Britain* left for Canada on September 6th, having reached Liverpool on August 14th, a new bow from stem to aft of the fore-peak bulkhead having been built on. The Pacific Steam Navigation Co.'s steamer *Orpesa* has also been

in hand for collision damage. The Dundee barque *Cartshall* is having auxiliary propelling machinery fitted. The s.s. *Bitern*, which was in collision with the *Hector*, has also been repaired. The s.s. *Western Australia* has also been fitted up for the Western Australian Government passenger and cargo service. It is of interest to note that Messrs. Grayson have been uninterruptedly in the same line of business for 153 years, and on September 19th, 1781, launched H.M. frigate *Ceres*, thirty-six guns. This vessel was with Nelson at the Battle of the Nile.

Mr. Austin Clover.—We regret to announce that the death occurred suddenly of Mr. Austin Clover in his 35th year at his Birkenhead residence on September 8th. Mr. Clover was an active member of the firm of Clover, Clayton & Co., shipbuilders and repairers, of Birkenhead.

The Mersey Docks and Harbour Board.—Following the retirement of Mr. Miles Kirk Burton, the general manager and secretary, the Mersey Docks and Harbour Board are now losing Mr. Anthony G. Lyster, engineer-in-chief, who it is expected will resign towards the end of the year. Mr. Lyster was born in Holyhead in 1852, and entered the Board's service in 1872 as a pupil, under his father, who was engineer-in-chief to the Board from 1861 to 1897. Later he spent some time at the Elswick works of Sir Wm. Armstrong. Since Mr. Lyster took up his present duties he has been responsible for the construction of the Riverside Station, the use of the landing stage by the largest steamers instead of ferries, the employment of one of the most powerful fleets of sand dredgers in the world for keeping a minimum depth of 30 ft. of water in the channels. A system of banks has also been designed to help to control the flow of water. Mr. Lyster's latest work has been the new Gladstone Docks, which are to cost £3,500,000. The pumping plant at these docks is to consist of Diesel engines and Worthington pumps. Mr. Lyster is to carry on consulting work at Westminster, when he will be associated with Sir John Wolff Barry. His services will still be retained by the Board in a consultative capacity.

The Convict Ship "Success."—This strange vessel has reached Boston on July 17th, having taken ninety-eight days on the voyage from Lancaster. The crew consisted of thirteen men besides the Captain, mate, steward and a wireless operator. Water and food became very scarce towards the finish, causing the crew to mutiny for two days. Current for the wireless was obtained from a small alternator and dynamo coupled direct to a 2¾ petrol engine.

NORTH-WEST OF ENGLAND.

(From our Own Correspondent.)

Barrow-in-Furness.—Several important changes have been effected during the past month in the works of Messrs. Vickers, Ltd. Mr. J. H. Boolds, the shipbuilding director, has left the firm so far as that capacity is concerned, but will be retained to attend to other business of the firm in connection with its many ramifications at home and abroad. Mr. Boolds has had charge of the shipyard department at Barrow for the past twelve years, during which time some very large and important warships and commercial tonnage have been dealt with. During the past year Mr. Boolds acted as chairman of the Shipbuilders' Federation, and was again nominated for that office this year, but owing to his many engagements and the poor condition of his health he had to decline the honour. Mr. John Brown, who was chief draughtsman for the Barrow Shipbuilding Co., and of the Naval Construction and Armaments Co., and who for some time past has been manager of the shipyard of Messrs. Vickers, Ltd., is also leaving the firm. He has been at Barrow in various positions for twenty-seven years. Some other changes are talked about at the Barrow shipyard. It is understood that Mr. Boolds' place will be filled by Mr. Bond, who has been manager at the London and Glasgow Shipbuilding yard on the Clyde, and that Mr. T. G. John will take the place of Mr. John Brown as manager of the shipyard department.

The Montreal Dock.—The floating dock built by Messrs. Vickers, Ltd., for Montreal, left Barrow in the beginning of September and is expected to arrive in the St. Lawrence in the beginning of October. She is in the charge of two powerful Dutch tugs, and is capable of going at about four knots per hour. Frequent wireless telegrams have been received from the dock saying that her passage across the Atlantic is going on satisfactorily. The premium on her insurance was very heavy, probably on account of the great amount of ice reported in the Atlantic.

H.M.S. Princess Royal.—This battle-cruiser, built by Messrs. Vickers, Ltd., has gone through her trials in the English Channel very satisfactorily. On her full-power trial she steamed at the rate of 32·7 knots an hour, thus beating her sister ship the *Lion*. She has, therefore, won the distinction of being the fastest warship in the navy outside, of course, the small vessels, such as torpedo craft. Later she reached the record speed of 34 knots for vessels of her class. She has engine power of 70,000 horses, but she proved herself capable of exceeding this power considerably. It is probable that future battle-cruisers will possess much higher horsepower, and that they will be manned with 14-inch guns.

H.I.J.M. Kongo.—During the month the 14-inch guns which will be mounted as the main armaments of this battle-cruiser went through their trials at Messrs. Vickers' Eskmeals range, and proved a thoroughly satisfactory weapon. The work of building this big warship is proceeding very satisfactorily, and no time is being lost in fitting her up, as she is required for early delivery on the one hand, and the place she occupies under the 200-ton crane in the Buccleuch Dock will in a few months be required by the Turkish battleship now on the stocks, and later on by the super-Dreadnought *Delhi*, which is well in frame.

Brazilian Orders.—The Vickers firm have delivered a fine powerful tugboat to the Brazilian Government. She proved on her trial to have a speed in excess of her specification of one and a half knots. The firm are busy with the three Brazilian river gunboats, which will find considerable employment.

Submarine Salvage Boat.—Messrs. Vickers, Ltd., have delivered to the Admiralty during the month the first of the submarine salvage boats which have been designed to lift any of this class of vessel which should happen to sink. It is believed orders for other two of these vessels will soon be given out, as one is needed at Chatham, one at Portsmouth and one at Rosyth. These vessels are constructed with a longitudinal inner well into which sunken submarines can be lifted by means of powerful capstans and wire ropes, and then docked for repairs.

Submarines.—Very considerable activity is noticeable in the submarine department, where orders for the British Admiralty are largely held. More work of this class is expected to come to Barrow shortly, as the newer class of vessels lately built are giving great satisfaction.

New Orders.—It is reported that the order has been placed with Messrs. Vickers, Ltd., for a floating dock for the Argentine Government. She will be a small vessel capable of lifting a vessel of 1,500 tons.

Marine Engineering.—Messrs. Vickers, Ltd., have a very large programme of work in hand in their marine engineering shops for propelling many other vessels beyond those now under construction at Barrow, and the probability is that this department of their works will be fully employed for some years to come. In the gunshops there is also a very large order sheet, and mountings are being made not only for the new 14-inch guns, but also for even smaller weapons for home and foreign Governments. The prospect of new orders for gun mountings is good.

Shipbuilding Material.—Steel makers are very busy on orders for all classes of shipbuilding material, and orders are held well forward. Prices have considerably advanced, and deliveries are in some cases belated owing to the large number of orders in hand.

BELFAST.

(From our Own Correspondent.)

Messrs. Harland & Wolff have completed the fitting out of the fine new twin-screw steamer *Oxfordshire* built by them for the Bibby Line. She is 490 feet long by 55 feet beam, and 8,600 gross tonnage, and the propelling machinery consists of two sets of quadruple-expansion engines. Within the next few days from writing the new steamer *Desna*, which is one of the number of vessels on hand for the Royal Mail Steam Packet Company, will also be ready for sea. They have an enormous amount of new tonnage under construction,

both on the slips and at the fitting out wharves, and several vessels of big dimensions have still to take the water before the close of the year. It is now definitely known that the name of the leviathan which they are building for the White Star Line is to be named *Britannic*. She will eclipse, in point of size to a very considerable extent, the *Olympic*, and important improvements will be embodied in the design. One of the most noteworthy features will be the carrying up of the inner skin to a height above the water line throughout the most vulnerable portions of the vessel. Special attention is also being given to the bulkhead question. The *Olympic*, having received injury to another of her propellers is expected in Belfast shortly to have the damage made good. It is possible that she may remain in the builder's hands then for the purpose of carrying out the extensive structural alterations which she is intended to undergo. The travelling public, forgetting—or seemingly forgetting—that there must always be risks at sea, appears to demand an unsinkable vessel. It is practically impossible to construct a vessel that will be absolutely unsinkable under every possible contingency, but Messrs. Harland & Wolff and the White Star Company are to be highly commended in their determination to build steamers that will approach as near as is humanly possible to the desired state of perfection.

The structural alterations to the *Olympic* will consist of an inner skin of thick plating, well stiffened, running for more than half the length of the vessel and extending from before the water-tight bulkhead in front of the forward boiler-room to aft of the turbine room, the inner skin being strongly connected to the outer shell by longitudinal plates and angles and especially strong connection at bulkheads and watertight divisions. This space will be the width of the web frames. An additional watertight bulkhead will be fitted, and other existing bulkheads carried up to the bridge deck. It is expected that both the *Britannic* and the *Olympic* will float with six compartments flooded. The alterations to the *Olympic* will cost about £250,000.

Lord Pirrie has for some time past been keenly interested in the development of oil engines for marine propulsion. That he has great faith in the future of this form of motive power is evinced by the fact that a company has been formed, with Lord Pirrie at its head, for the construction of Diesel engines. It is understood that these will be built at Messrs. Harland & Wolff's Govan yard.

Messrs. Workman, Clark & Co.—The new steamer *Vestris*, built by this firm for the Liverpool, Brazil and River Plate Steam Navigation Co., Ltd., had a successful trial in Belfast Lough on Sept. 3rd. The new vessel is 511 feet long, with a gross tonnage of about 10,000, and is propelled by two sets of quadruple-expansion engines balanced on the Shlick-Tweedy system. They have the steamer *Veronese*, built by them for the same owners in 1906, in hand for extensive overhaul and repairs.

Messrs. Maccoll & Co. have carried out a fair amount of repair work recently, including bottom damage repairs on the Norwegian steamer *Dorre*.

The Harbour.—On 18th September, a regrettable catastrophe occurred, the 100-tons crane belonging to the Harbour Commissioners collapsing into the river while undergoing a test load after completion of overhaul and repairs. The disaster was, unfortunately, accompanied by loss of life, one man and an apprentice being drowned, whilst another man received serious injury. Messrs. Harland & Wolff's huge floating crane is being requisitioned to lift the fallen crane and machinery from the bed of the river.

Londonderry.—In the August issue of "The Marine Engineer and Naval Architect," reference was made to the coming revival of shipbuilding on the Foyle. This is now an accomplished fact, The North of Ireland Shipbuilding Co. having already started operations. They have several orders in hand, including the building of a Canadian Lake steamer.

It is intended to hold an Engineering and Allied Trades Exhibition at the Coliseum, Bristol, from February 1st to 22nd next. Mr. Chas. Howes, Centre Chambers, Bristol, has the matter in hand.

Messrs. Souper & Callaghan of Deansgate, Manchester, have brought out a new combination tool for the workshop. The price is £12 10s., and it combines a rotary blower forge, an anvil a mechanic's vice a pipe vice, an emery wheel and a drill press.

LAUNCHES AND TRIAL TRIPS.

LAUNCHES—English.

Thessalia. On August 29th, there was launched from the yard of the Tyne Iron Shipbuilding Co., Ltd., Willington Quay-on-Tyne, a steel screw steamer built to the order of the International Line Steamship Co., Ltd., of Whitby. She is built on the "Isherwood" patent system of longitudinal framing and is the sixth vessel built on the "Isherwood" system by these builders, who were the first to build this type on the Tyne. The vessel is built to the highest class at Lloyd's and is of the following dimensions, *viz.*:—Length over-all, about 360 ft.; breadth extreme, 50 ft.; depth moulded, 25 ft. 10 in. She is built under the single-deck rule with poop, bridge and forecastle, has water ballast fitted right fore and aft on the cellular system and is also fitted with all modern improvements for the rapid loading and discharging of cargo, including eight double cylindered steam winches, direct-acting steam windlass, large multitubular donkey boiler, steam-steering gear by Messrs. Donkin & Co., with right and left screw gear aft. She is fitted with double derricks to all main cargo holds and has derrick posts on bridge for dealing with the cross bunker hatch, and is in all respects an exceptionally good example of the modern cargo steamer, as she carries about 6,400 tons deadweight on the very light draught of 21½ ft. The engines, which are to be supplied by Messrs. John Dickinson & Sons, Ltd., of Sunderland, are of the triple-expansion type, having cylinders 24 in., 40 in. and 66 in. by 45 in. stroke, with two boilers 16 ft. by 10 ft. 6 in., working at a pressure of 180 lbs. Messrs. Wailes, Dove & Co.'s "Bitumastic" enamel has been applied to the bunkers, engine and boiler-room tanks, and their "Bitumastic" covering to tank top in boiler-room.

Isa.—On August 20th, there was launched from the yard of Messrs. Cochrane & Sons, Selby, a steel screw trawler, the principal dimensions being 115 ft. by 21 ft. 6 in. by 12 ft. 6 in. moulded. The vessel has been built to the order of Messrs. Pêcheries à Vapeur Société Anonyme, Ostend, and will be fitted with powerful triple-expansion engines by Messrs. Earle's Shipbuilding and Engineering Co., Ltd., Hull.

Karpat.—On August 29th, Messrs. William Dobson & Co. launched from their shipbuilding works at Walker a steel screw steamer which they have built for the Hungarian Levant Steamship Co., of Budapest. The dimensions are:—Length between perpendiculars, 378 ft.; breadth, 53 ft. 3 in.; depth moulded, 26 ft. 11 in. The vessel is of the single-deck type with long bridge from mast to mast, also poop and forecastle. Complete gram-carrying arrangements are provided, also large outfit of auxiliary machinery. The main engines are being constructed by the North-Eastern Marine Engineering Co., Ltd., Wallsend, and have cylinders 24 in., 39 in., 66 in. diameter with 45 in. stroke. Steam is supplied by three boilers 14 ft. 3 in. by 10 ft. 6 in., with a pressure of 180 lbs. per square inch.

Arca.—On August 30th, there was launched from the Jarrow shipyard of Messrs. Palmer's Shipbuilding and Iron Co., Ltd., the steamer *Arca*, built for the Anglo-Saxon Petroleum Co., Ltd., for carrying oil or benzine in bulk. The vessel is about 375 ft. in length and has a deadweight capacity of about 7,000 tons. She has been built to class 100 A1 Lloyd's under special survey, and has long poop, bridge and forecastle. The machinery will be placed aft. The oil compartments are divided into eight pairs of tanks, two cofferdams and pump-room. The latter is placed on the aft side of the bridge with entrance from the upper deck. The oil tanks are arranged below the main deck, with trunk built the whole length of the tanks in the lower decks. Summer tanks are arranged at the sides of the trunk to enable the vessel to carry her deadweight of benzine. She has a cargo hold at the fore end of the oil tanks, and water ballast is provided for in cellular double bottom under the engines and boilers, and also in fore and aft peaks for trimming purposes. The *Arca* is constructed throughout on the transverse system of framing. The vessel is to be fitted with triple-expansion engines by the Palmer Company, steam being supplied by three single-ended boilers arranged to burn coal or liquid fuel, working at a pressure of 180 lbs. per square inch. During construction the vessel has been under the personal supervision of the owner's superintendent, Mr. J. C. Stephens.

Portloo.—On August 30th, there was launched at Sunderland the screw steamer *Portloo*, which has been built for Messrs. McNeil, Hinde & Co., of Cardiff. She is of the single-deck type with poop, bridge and forecastle. The vessel has perfectly clear holds, and is specially designed for the pitch-pine trade. Water ballast is provided in double bottom, and fore and after peaks. The vessel is fitted up in accordance with the Board of Trade regulations for the carriage of grain. Very spacious accommodation for captain, and a separate room for each officer and engineer are arranged in large deckhouse on the bridge.

Maston.—On August 31st, Messrs. Wm. Pickersgill and Sons, Ltd., launched from their yard at Southwick, Sunderland, the above steel screw steamer. Her dimensions are :—Length, 366 ft. ; breadth, 50 ft., and depth, 26 ft. 4 in. She has been built under special survey to take Lloyd's highest class as a single-deck steamer with long bridge, and is fitted with cellular double bottom throughout for water ballast, in addition to which the after and fore peaks are fitted as ballast tanks. She is provided with five large cargo hatches, each of which is fitted with double derricks capable of raising heavy weights, derrick posts being fitted where necessary. The vessel will be rigged as a fore and aft schooner, with steel lower masts and wood telescopic topmasts, six steam winches will be supplied by Messrs. J. Lynn & Co., Ltd., and a special quick-warping windlass by Messrs. Emmerson, Walker and Thompson Bros. The steam-steering gear is by Messrs. Lynn & Co., fitted in house amidships abaft the engine-room, and is controlled by means of rods and bevelled wheels from wheelhouse on bridge. The donkey boiler for supplying steam to deck range is by Messrs. Thos. Sudron & Co., Stockton. The captain and officers are berthed in deckhouses on bridge, together with a large mess-room tastefully fitted out in oak, and houses are also fitted on bridge for the accommodation of the engineers. The crew and petty officers are berthed in the forecastle. The machinery and boilers are being supplied by Messrs. J. Dickinson & Sons, Ltd., Sunderland, the engines having cylinders 25 in. by 42 in. by 68 in. by 48 in. stroke, and the two specially large boilers are of steel with a working pressure of 180 lbs. The steamer has been built to the order of Messrs. Thomas & Appleton, Cardiff, and during construction has been under the supervision of Mr. Appleton. Messrs. Wailes, Dove & Co.'s " Bitumastic " enamel has been applied to the bunkers and boiler-room tank and their patent " Bitumastic " covering to tank top in boiler-room.

Velia.—On August 31st, there was launched from the yard of Messrs. Cochrane & Sons, Selby, a steel screw trawler, the principal dimensions being 133 ft. 4 in. by 23 ft. by 12 ft. 9 in. moulded. The vessel has been built to the order of Messrs. J. Marr & Son, Ltd., Fleetwood, and will be replete with all the latest improvements for the fishing trade. She will be fitted with powerful triple-expansion engines by Messrs. C. D. Holmes & Co., Ltd., Hull.

Thistleard.—On September 10th, Messrs. Craig, Taylor and Co., Ltd., launched from their Thornaby Shipbuilding Yard, Thornaby-on-Tees, a handsomely modelled single-deck screw steamer of the following dimensions, *viz.* :—382 ft. by 51 ft. 4½ in. by 26 ft. 6 in. moulded. She is built of steel to the highest class in Lloyd's registry, under special survey, and has poop, long bridge and forecastle combined, water ballast in double bottom fore and aft and in peaks. She is equipped with patent direct steam windlass with quick-warping ends, steam-steering gear, eight steam winches, and multitubular donkey boiler, shifting boards in holds for carrying grain cargoes, telescopic masts to Manchester Ship Canal requirements, double derricks and all the latest improvements for rapid loading and discharging. The accommodation for captain, spare rooms and officers is neatly fitted up in deckhouses amidships, the engineers being in deckhouse alongside engine casing, and the crew in the poop. Her engines have been constructed by Messrs. Blair & Co., Ltd., Stockton-on-Tees, the cylinders being 26 in., 42½ in., 69½ in. by 45 in., with two large steel boilers working at 180 lb. pressure. The vessel, which is a duplicate of the *Thistleban*, built by Messrs. Craig, Taylor & Co., Ltd., some little time ago for the same owners, has been built to the order of The Albyn Line, Ltd. (Messrs. Allan, Black & Co., Sunderland, managers), under the superintendence of Messrs. M. Wawn & Son, Sunderland.

Maria Racich.—On September 10th, Messrs. Wm. Doxford and Sons, Ltd., launched from their yard at Pallion, Sunderland, the steamship *Maria Racich*, built to the order of Giovanni Racich, Esq., Trieste. The dimensions of the vessel are :—Length, 380 ft. ; breadth, 50¾ ft. ; depth moulded, 27½ ft. Deadweight capacity, 7,900 tons. The classification is with the British Corporation, and during construction the vessel has been superintended by Mr. J Baxter, Newcastle, on behalf of the owner. Messrs. Doxford are supplying the engines and boilers.

Confield.—On September 11th, Messrs. William Gray and Co., Ltd., launched the handsome steel screw steamer *Confield*, which they have built for Messrs. E. J. Sutton & Co., Newcastle. She will take the highest class in Lloyd's register and is of the following dimensions, *viz.* : Length overall, 325 ft. 6in. ; breadth, 46 ft. 6 in., and depth, 23 ft. 5½ in., with long bridge, poop and topgallant forecastle. The saloon, state-rooms, captain's, officers' and engineers' rooms, etc., will be fitted up in houses on the bridge deck, and the crew's berths in the forecastle. The hull is built with deep frames, cellular double bottom and large after and fore-peak ballast tanks, six steam winches, steam-steering gear amidships, hand-screw gear aft, patent direct steam windlass, large horizontal multitubular donkey boiler, stockless anchors, shifting boards throughout, telescopic masts with fore and aft rig, and all requirements for a first-class cargo steamer. Triple-expansion engines are being supplied by the Central Marine Engine Works of the builders, having cylinders 23 in., 36½ in. and 62 in. diameter, with a piston stroke of 42 in., and two large steel boilers for a working pressure of 180 lbs. per square inch. The ship and machinery have been built under the superintendence of Messrs. Havelock & Chaston, of Newcastle, on behalf of the owners.

LAUNCHES—Scotch.

Tuggerah.—On August 19th, the Clyde Shipbuilding and Engineering Co., Ltd., Port Glasgow, launched a steel screw steamer, 186 ft. by 28 ft. 9 in. by 14 ft. 9 in., for The Wallarah Coal Co., Ltd., Sydney. The vessel was named *Tuggerah* by Mrs. Johnson, wife of the captain of the vessel, and immediately after the launch was placed in the Company's dock to receive her machinery, which has also been constructed by the builders.

Hawkhead.—On August 24th, there was launched at Port Glasgow by Messrs. Russell & Co., a steamer of the following dimensions :—Length, 385 ft. ; breadth, 52 ft., and depth, 29 ft. She will have a carrying capacity of about 7,600 tons. The vessel, which is for Messrs. Crawford & Rowat, Glasgow, has been constructed to Lloyd's 100 A1 class. Messrs. Wailes, Dove & Co.'s " Bitumastic " enamel has been applied to the bunkers, ballast tanks and bilges in engine and boiler rooms, and their " Bitumastic " covering to tank top in boiler-room.

Saint Andrew.—On August 27th, Messrs. Archd. McMillan and Son, Ltd., Dumbarton, launched the steamer *Saint Andrew*, which they have built for Messrs. Rankin, Gilmour and Co., Liverpool. The vessel, the sixth which Messrs. McMillan have built for this firm, is of the following dimensions :—Length between perpendiculars, 400 ft. ; breadth, 52 ft., and depth, 30 ft. She is fitted with all the latest arrangements for working cargo, and the holds are divided longitudinally for grain cargoes by a steel bulkhead. The machinery will be supplied by Messrs. David Rowan & Co., Glasgow. Both vessel and machinery have been built under the special survey of Lloyd's register for their highest class. During construction the vessel has been under the supervision of Mr. Reid, Captain Pugh and Mr. Forrest, the owners' representatives. Messrs. Wailes, Dove & Co.'s " Bitumastic " covering has been applied to the tank tops under engines and boilers, and their " Bitumastic " enamel to the coal pockets.

Empress of Russia.—On August 28th, the new Canadian-Pacific Railway Company's liner *Empress of Russia*, one of the two ships which are being built by the Fairfield Shipbuilding and Engineering Co., Glasgow, for service between Vancouver and Japan and China, was launched. Her sister ship, the *Empress of Asia*, will be put into the water a few weeks hence, and the two ships will eventually take the place of the three Empresses now engaged in the service. The new vessels will be each of 15,000 tons gross, and will be not only the largest merchant ships sailing in the Pacific, but

will also be, by nearly 2,000 tons, the largest of the fleet of over fifty vessels owned by the Canadian Pacific Railway Company. In the important matter of the safety of life at sea, they are the first vessels to be built with an ability to float with any four compartments flooded, instead of two, which has been the Board of Trade standard. Their machinery embodies important improvements in turbine propulsion, a feature being the introduction of an intermediate pressure turbine, which will provide a much wider range for the expansion of the steam, and will effect a marked advance in the problem of economical steam consumption. Another feature is that they are built with the cruiser stern, and will both be fitted so that they may be converted into armoured cruisers. Accommodation is provided for 1,100 passengers and a complement of 475 officers and crew, while the cargo capacity amounts to about 4,000 tons. The ships are to be propelled by four screws, driven by four sets of Parsons turbines, and are designed for a speed of 20 knots.

Cururupu. On September 3rd, there was launched from the yard of Messrs. Napier & Miller, Ltd., Old Kilpatrick, the steel twin-screw steamer *Cururupu*, the second of two vessels built to the order of Messrs. James Pollock, Sons & Co., Ltd., London, for the Brazilian coasting trade. The vessel's dimensions are:—Length, 200 ft.; breadth, 32 ft.; moulded depth, 11 ft. 3 in., with a gross tonnage of about 700 tons, built to Lloyd's rules for their highest class. The vessel is rigged as a two-masted schooner, has main, promenade and boat decks. Accommodation for first-class passengers is provided for in state-rooms on promenade deck and on main deck aft with dining saloon, music-room and smoking-room. Electric light is fitted throughout. The vessel has steam windlass, steam-steering gear, and water ballast in fore and aft-peak tanks. Machinery, consisting of triple-expansion engines and one large boiler, is being supplied by Messrs. Miller & Macfie, Ltd., Stanley Engine Works, Glasgow. During construction the vessel has been under the supervision of Mr. Thomas Murray. This is the sixth steamer built by Messrs. Napier & Miller, Ltd., to the order of Messrs. James Pollock, Sons & Co., Ltd. Messrs. Matthew Keenan and Co., Ltd., have the contract to apply their non-conducting composition to all boilers and steam pipes.

Cabo Menor.—At Grangemouth there has been launched the steamer *Cabo Menor*, built to the order of Messrs. Ybarra and Co., Seville, for their fruit and wine trade. The vessel, which is of the improved awning deck type, has been constructed in excess of Lloyd's requirements. She has three complete decks and part shelter deck. Accommodation for a limited number of passengers is provided. The dimensions of the vessel are:—Length between perpendiculars, 265 ft.; breadth, 38 ft. 6 in.; depth moulded, 18 ft. 3 in., and deadweight capacity, 3,000 tons on Lloyd's summer freeboard. Machinery designed to give a high rate of speed will be supplied. The cylinders will be 20 in., 33 in. and 53 in. in diameter, with a 36-in. stroke, steam being supplied from two single-ended boilers. Messrs. Cochran & Co. (Annan), Ltd., have supplied a Cochran donkey boiler fitted with patent seamless furnace.

Dryden.—There has been launched at Port Glasgow the steamer *Dryden*, which has been built to the order of Messrs. Lamport & Holt, Liverpool and London. The vessel is of the following dimensions:—Length, 439 ft.; breadth, 53 ft., and depth moulded, 32 ft. 6 in. The *Dryden* is constructed on the Isherwood system, and has been built to Lloyd's highest class. The machinery is designed to give a speed of 12 knots.

Neuralia.—On September 12th, the new twin-screw mail and passenger steamer *Neuralia* was launched by Messrs. Barclay, Curle & Co., Whiteinch, for the British India Steam Navigation Co. The vessel is 480 ft. in length, 58 ft. in breadth, 34 ft. in depth, 8,950 tons gross, and 5,620 tons nett. She will be supplied by the builders with two sets of quadruple-expansion engines having cylinders 23¾ in., 33 in., 47 in. and 68 in. in diameter respectively, and a stroke of 48 in.; and also with seven single-ended boilers, each 13 ft. 2 in. by 11 ft. 6 in.; designed for a pressure of 215 lbs. and fitted with Howden's system of forced draught. The vessel is intended for service between London and the East. The *Neuralia* is the first of two sister ships which Messrs. Barclay, Curle & Co. are building for the British India Company.

Motor Coasting Vessel.—There has been launched from the yard of Messrs. A. Jeffrey & Co., Alloa, the second motor coasting vessel built to the order of the Coasting Motor Shipping Co., Glasgow. The new vessel, like her sister ship the *Innesmurray*, is 100 ft. long, 13 ft. 9 in. broad, and 9 ft. deep, and has a carrying capacity of 270 tons. She will be fitted with a Beardmore semi Diesel motor engine of 130 h.p., while she will also have a Clark-Chapman motor winch.

LAUNCHES—Irish.

Floating Caisson.—On August 10th, shortly after noon, Messrs. Workman, Clark & Co., Ltd., Belfast, launched from their North Yard a large floating caisson, the first of two designed and being constructed by them for the British Admiralty. This unique vessel is designated *Caisson "S,"* and is probably the largest of its class in the world. It is intended for use in the new dry dock at present in course of construction at Portsmouth Dockyard for the accommodation of the new super Dreadnoughts being built for His Majesty's Government. This caisson has been designed on the most modern principles under the supervision of the Admiralty overseers, and is capable of being manipulated with the minimum amount of labour. The pumping arrangements for sinking and floating the caisson are controlled by an approved system of compressed air supplied from the dockyard mains, with auxiliary emergency gear consisting of a couple of powerful Admiralty pattern Downton pumps.

Pastores.—On August 17th, Messrs. Workman, Clark and Co., Ltd., Belfast, launched from their South Yard a new twin-screw steamer, built by them for general fruit carrying and passenger service between New York and West Indian ports. The *Pastores* is 486 ft. in length, with a gross tonnage of about 8,000 tons, and has been built in accordance with the requirements of the British Corporation Registry of Shipping, the British Board of Trade and the United States Steamship Inspection Service. A special feature of the vessel is the accommodation for about 150 first-class passengers, in which comfort and artistic taste are admirably combined. The state-rooms, arranged for one, two and three persons, are all roomy apartments, a number of them being so arranged with doors and adjoining lavatories as to be available for family suites, while there are also seven special cabins luxuriously furnished and provided with separate lavatories. The public rooms include commodious dining saloon, with tables arranged on the restaurant plan, a luxurious music-room opening off the main entrance hall; also a comfortable smoke-room. All the rooms, public and private, are efficiently ventilated by means of cooled fresh air delivered through ducts, while each room is also provided with electrically driven fans. The cargo space of the vessel is divided into nine compartments, all specially insulated and prepared for the carriage of fruit in bulk. This perishable cargo will be preserved during transit by means of cooled fresh air delivered by electrically-driven fans through ducts from the refrigerating rooms to each compartment. The propelling machinery consists of two independent sets of quadruple-expansion engines of approved design, complete with all necessary auxiliary machinery and supplied with steam from three double-ended and one single-ended steel cylindrical multitubular boilers.

FOREIGN LAUNCH.

Jupiter.—On August 24th, the United States collier *Jupiter*, an electrically-driven vessel, was launched at the Mare Island, Cal., Navy Yard. The vessel, which will make about 14 knots an hour, is 572 ft. long by 65 ft. beam, and has a carrying capacity of 12,500 tons of coal and 375,000 gallons of fuel oil. Power is supplied by a six-stage Curtis steam turbine, which is directly connected to a bipolar alternator, the speed of the unit at 14 knots being about 2,000 r.p.m., and the voltage about 2,000. This generating unit delivers its output to two motors, one mounted directly upon each propeller shaft. These motors have thirty-six poles, so that the ratio of speed reduction is 18 to 1, the propellers at 14 knots being designed to operate at 110 r.p.m. Coal can be loaded from the *Jupiter* into a warship at the rate of 100 tons an hour, and duplex pumps will permit her to take in or pump out oil at the rate of 120,000 gallons an hour.

TRIAL TRIPS.

Nurtureton.—On August 17th, the new steamer *Nurtureton*, built by Messrs. Ropner & Sons, Ltd., Stockton-on-Tees, to the order of Messrs. R. Chapman & Son, Newcastle-on-Tyne, made her official trial trip in the Tees Bay, when she maintained a high rate of speed. After a satisfactory trial trip the vessel steamed round to Cardiff. For Launch, see September issue.

Bridgeport.—On August 19th, the steamship *Bridgeport*, built and engined by Messrs. Wm. Doxford & Sons, Ltd., Pallion, Sunderland, ran a successful fully-loaded sea trial, when a mean speed of 12 knots was obtained. For Launch, see September issue.

Cardiff Hall.—On August 28th, the steamship *Cardiff Hall*, built and engined by Messrs. Wm. Doxford & Sons, Ltd., Pallion, Sunderland, ran a successful sea trial, when a mean speed of 10¾ knots was obtained. For Launch, see September issue.

Flixton.—On August 29th, the handsome steel screw steamer *Flixton*, which has just been completed by Messrs. Wm. Gray & Co. for the Deddington Steamship Co., Ltd. (Messrs. H. Samman & Co., managers), of Hull, was sent to sea for her trial trip. The results obtained were highly satisfactory, and on the completion of the trial the vessel at once proceeded to her loading port. For Launch, see September issue.

Betty.—On August 30th, the new steel screw steamer *Betty*, built by Messrs. Wood, Skinner & Co., Ltd., Bill Quay-on-Tyne, to the order of Mr. Martin Carl, of Copenhagen, left the Tyne for her official trial trip. This vessel is of the single-deck type, with poop, long bridge and topgallant forecastle, and is fitted with all the latest improvements for handling cargo. The propelling machinery, which has been constructed and fitted at the Northumberland Engine Works, Wallsend-on-Tyne, of Messrs. The North-Eastern Marine Engineering Co., Ltd., Wallsend and Sunderland, consists of a set of their latest type of triple-expansion engines, having cylinders 21 in., 34 in. and 56 in., with stroke of 36 in., steam being supplied by two large steel boilers working at a pressure of 180 lbs. per square inch. During the trial run the machinery worked very smoothly and gave great satisfaction to all concerned, a mean speed of over 10 knots being easily maintained.

Vestris.—On September 3rd, the *Vestris* left Belfast Lough after a satisfactory trial trip and proceeded to Liverpool, where she embarked passengers for her initial voyage to South America. The *Vestris* has been built and engined by Messrs. Workman, Clark & Co., Ltd., Belfast, together with her sister vessels *Vandyck* and *Vauban*; they have been specially designed for the British and South American service of the Liverpool, Brazil and River Plate Steam Navigation Co., Ltd. (Messrs. Lamport & Holt, Ltd., Liverpool, managers). For Launch, see June issue.

Garm.—On September 3rd, the steamship *Garm*, built by the Campbeltown Shipbuilding Co., Campbeltown, for Messrs. Stockholms Rederiaktiebolag Svea, ran trials at Wemyss Bay. Triple-expansion engines taking steam from two large boilers, under natural draught, have been supplied by Messrs. John G. Kincaid & Co., Ltd., Greenock. The trials were very satisfactory.

Marmion.—On September 5th, the s.s. *Marmion* ran her official trial trip in Hartlepool Bay. The vessel has been built by Messrs. Irvine's Shipbuilding and Dry Docks Co., Ltd., West Hartlepool, for Messrs. The Pyman Steamship Co., Ltd., West Hartlepool (Messrs. George Pyman & Co., managers). Throughout the trial the engines and all auxiliaries worked splendidly, a speed of 12½ knots being obtained. The owners' representatives expressed entire satisfaction, and the vessel afterwards proceeded to the Tyne to load. The ship and engines have been constructed under the superintendence of Mr. W. Cromar. For Launch, see September issue.

Nicosian.—On September 7th, the large steel screw steamer *Nicosian* of 6,369 tons gross, built to the order of Messrs. Frederick Leyland & Co., Ltd., Liverpool, by Messrs. David and William Henderson & Co., Ltd., Partick, Glasgow, underwent her trials on the Firth of Clyde. During the trials everything worked well and to the satisfaction of owners' representative and builders. For Launch, see September issue.

Hollington.—On September 9th, the steel screw steamer *Hollington*, built by Messrs. The Northumberland Shipbuilding Co., Ltd., Howdon-on-Tyne, to the order of Francis Stanley Holland, Esq., London, left the Tyne for her official trial trip. The trial trip proved in every way satisfactory and a speed of 12 knots was obtained, and afterwards the vessel proceeded to the Commissioners' Staithes for bunker coals. For Launch, see June issue, page 453.

Hornfels.—On September 12th, the handsomely-modelled steel screw steamer *Hornfels*, built by Messrs. Craig, Taylor and Co., Ltd., Thornaby Shipbuilding Yard, Stockton-on-Tees, to the order of Mr. H. C. Horn, of Lubeck, was taken to sea for her official trial trip. The vessel, which has been built to an exceptionally good specification, is of the following dimensions, *viz.*, 374 ft. by 50 ft. by 31 ft. 4 in. moulded to bridge deck. She is built of steel to the highest class in Lloyd's registry, and has long poop, and topgallant forecastle; large water-ballast capacity in double bottom, fore and aft, and in peaks; she is equipped with patent direct steam windlass with quick warping ends, steam steering gear, eleven steam winches, double derricks and gaffs to each mast; stockless anchors; large hatches, and all the latest improvements for rapid loading and discharging. The masts have been arranged to suit the Manchester Ship Canal requirements; steel shifting boards are fitted through out holds and 'tween decks for the carriage of grain cargoes. The accommodation for Captain, spare rooms and officers is neatly fitted up in deckhouse amidships on bridge, the engineers being in deckhouses alongside engine casing, and the crew in the forecastle. Her engines have been constructed by The North-Eastern Marine Engineering Co., Ltd., Sunderland, the cylinders being 25 in., 41 in., 68 in. by 45 in., with two large boilers working at 180 lbs. pressure, including Howden's system of forced draught. The vessel has been built under the superintendence of Captain Bartelt, Mr. B. Schmidt, assisted by Captain Ernst Thoms and Mr. A. Schomer. During the run everything worked with the greatest smoothness, and a speed of about 11 knots was maintained. Captain Bartelt, who was on board representing Mr. H. C. Horn, expressed himself as being very highly pleased with the ship and engines. Immediately after the trial trip the vessel proceeded to Tyne Dock under command of Captain Ernst Thoms. This is a sister-ship to the *Hornsfels*, renamed *Haidar Pasha*, particulars of whose trial trip were published in our September issue.

Russian Prince.—On September 13th, the new large oil-tank steamer *Russian Prince*, built by the Tyne Iron Shipbuilding Co., Ltd., of Willington Quay-on-Tyne, for the Prince Line, Ltd., of Newcastle-on-Tyne, was taken to sea for her trial trip. This vessel, which is 370 ft. long by 48 ft. beam and 28 ft. moulded depth, has been constructed to the highest class at Lloyd's for carrying oil in bulk on the Isherwood patent system of longitudinal framing. The vessel will carry over 6,000 tons deadweight and has twenty-eight separate oil-tight compartments, together with oil fuel compartments. She is also fitted with very complete installations of electric light and oil-heating arrangements and steam-heating installation. The oil installation consists of two specially designed oil pumps arranged to pump through a double line of oil piping. The accommodation of the vessel is very handsomely fitted up, the saloon being in polished wainscot oak. The machinery, which has been supplied by Messrs. The Wallsend Slipway and Engineering Co., Ltd., consists of engines 24 in., 42 in. and 68 in. by 48 in. stroke, with two single-ended boilers, and on trial they enabled the vessel to attain a speed of 12 knots during a series of runs over the measured mile. Immediately after the trial trip the vessel disembarked her passengers and then proceeded straight on her voyage to Amsterdam. During construction the vessel and machinery have been under the superintendence of Mr. Traill and Mr. Pringle, of the Prince Line, Ltd.

Thyra Menier.—On September 14th, the trial of the s.s. *Thyra Menier* took place, and was quite satisfactory. Captain T. L. Evans, the managing owner, was present at the trial and expressed himself as extremely pleased in every way with the vessel, and described her as the best vessel in his fleet. The builders were represented by Mr. T. W. Crozier; Mr. Maxwell Ballard, the designer and the patentee of the ship was also present. After trial the vessel proceeded on her maiden voyage to America. For Launch, see September issue.

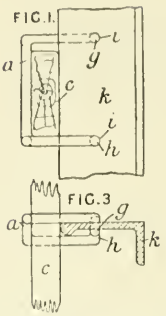
Scarsdale.—On September 14th, the first-class finely modified cargo steamer *Scarsdale*, built by Messrs. Robert Thompson & Sons, Ltd., at their Southwick Yard, to the order of Messrs. The Dale Steamship Co., Ltd. (Messrs. Lucas and Co., managers), of Bristol, proceeded to sea for her official trial. Her principal dimensions are :—Length overall, 301 ft.; breadth, 50 ft., and depth moulded, 25 ft. 10 in. She is built to take the highest class at Lloyd's, and is constructed with single deck and designed to carry a large deadweight cargo on a light draught. Ample water ballast is provided in the cellular bottom and in fore and after peaks. Poop and bridge are fitted for cargo and topgallant forecastle for crew. Accommodation is arranged for captain and steward in a large steel house at the fore end of the bridge, the dining saloon, etc., being tastefully fitted up in oak. The chart-room is fitted above this house under upper flying bridge. The officers', engineers' and apprentices' berths, with mess-room, bath-room, etc., are situate in steel houses abreast the engine casing, and the petty officers are berthed in a steel house at fore end of poop space. There are five cargo hatchways, with double derricks to each, worked by seven powerful steam winches, and a large multitubular donkey boiler of ample capacity for the supply of steam to the deck machinery. The vessel is thoroughly up-to-date, and the outfit includes the latest appliances for navigation, including semaphore, patent deep-sea sounding machine and log fitted with outrigger booms. The engines, by Messrs. John Dickinson & Sons, Ltd., Sunderland, have cylinders 25 in., 41 in. and 67 in., with a stroke of 45 in., steam being supplied by two large boilers working at a pressure of 180 lbs. per square inch. During construction the vessel and machinery have been under the supervision of Messrs. Fergusson and Law, of Cardiff, and Captain Davis. The trial trip was very successful, the engines running with perfect smoothness, easily attaining a mean speed of about 11¼ knots, and Mr. B. C. Lucas, managing owner, who was on board, expressed entire satisfaction with both the vessel and machinery. After the trial the vessel proceeded to Hull under the command of Captain John Davis.

Petra.—On September 17th, the new steamer *Petra*, built by the Sunderland Shipbuilding Co., Ltd., proceeded on her official trial. The principal dimensions are :—Length, 300 ft.; breadth, 42 ft. 6 in., and depth, 21 ft. 6 in., having poop, bridge and topgallant forecastle. She is specially designed to carry a large deadweight on a light draught, and will take Lloyd's 100 A1 class under special survey. Water ballast is fitted in cellular bottom and peak tank. The deck machinery consists of seven steam winches, double derricks, steam-steering gear and direct steam windlass, all being worked by a large horizontal donkey boiler. Accommodation is placed on top of bridge for captain, officers and engineers, and for sailors and firemen in forecastle; the saloon is amidships and is fitted up in a tasteful manner. The main engines are by the North-Eastern Marine Engineering Co., Ltd., Sunderland, and have cylinders 22 in., 36 in. and 59 in. by 39 in. stroke, steam being supplied by two large boilers working at a pressure of 180 lbs. per square inch. After proceeding to sea, the steamer made several runs over the measured mile, when a mean speed of 11½ knots was obtained, which gave entire satisfaction to all on board, after which the vessel proceeded to the Tyne, where she will load for St. Petersburg. The steamer has been built to the order of M. S. Pedersen, Esq., of Tonsberg, and during construction has been inspected by Messrs. C. A. Bushel, Nicol & Co., of Newcastle, and Captain Larsen on behalf of the owners.

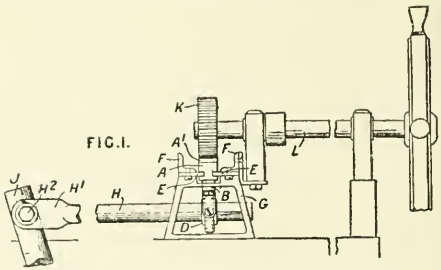
The Marine Engineer and Naval Architect Patent Record.

Compiled by Messrs. E. P. Alexander & Son, Chartered Patent Agents, 306, High Holborn, London, W.C.

11,791. Cargo Battens.—A cleat for a cargo-batten is comprised of a single piece of wire or round iron *a* bent so as to embrace three sides of the batten *c*, and having the ends *g*, *h* bent at right-angles and inserted into apertures *i* in the frame *k* from opposite sides, or from the same side.

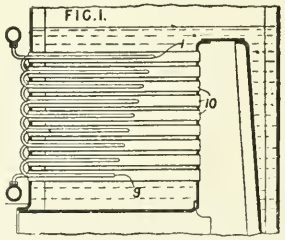


11,878. Ships' Steering Gear. Steering gear for ships comprises the combination of a tiller pivotally connected to the rudder head with a toothed rack member carrying on a universal joint a sleeve through which the tiller is free to slide and means for moving the rack in suitable guides. A bar A, Fig. 1, has a toothed rack A^1 on the upper side and a bracket B on the lower side. In the bracket is universally mounted a sleeve D adapted to carry one end of the tiller H, the other end being forked at H^1, to fit round the rudder head J, to which it is pivotally attached by the bolt



H^2. The bar A has grooves into which project guide-bars E which are carried by angle-irons F on supports G. A pinion K on the hand-wheel shaft L engages the toothed rack A^1, this shaft being, if desired, out of the centre line of the ship. In a modification, the rigid rack may be replaced by a flexible rack so that the ends beyond the guide may not project, but hang down when the helm is hard over. The ends may be connected or attached to springs or counterweights. Twin chains with the sleeve bracket between them may be used.

13,317. Steam Superheaters. In a superheater consisting of tubes inserted in the flue-tubes of a marine or other multitubular boiler, in order to equalize the draught through the flue-tubes the superheater-tubes are formed of decreasing



lengths from top to bottom of the flue-tubes. In the superheater shown, tubes formed with loops 1 . . . 9 of gradually varying lengths project into successive vertical rows of flue-tubes 10.

The Marine Engineer

And Naval Architect.

LONDON, NOVEMBER, 1912.

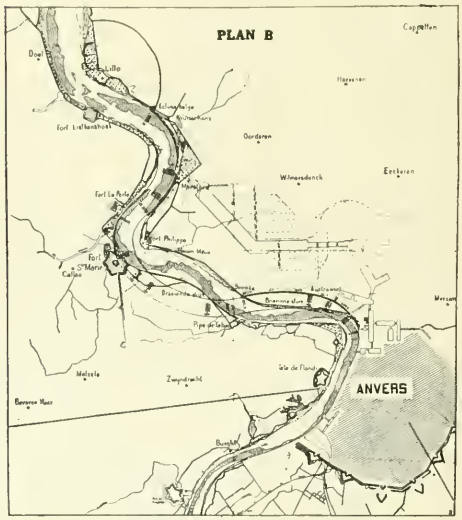
EDITORIAL NOTES.

THE presidential addresses delivered before the various scientific societies from time to time, usually take the form of a treatise on the progress of the particular branch of science in which the president is specially interested, and in this way a very useful and concise record is available from which general results can be obtained. We are sure that those of our readers who have had the pleasure of reading the address of the Hon. Sir Charles Algernon Parsons, K.C.B., F.R.S., delivered at the Bolbec Hall, Newcastle-on-Tyne, on October 25th last, on his taking the presidential chair of the North-East Coast Institution of Engineers and Shipbuilders, will have no feeling of disappointment as to the subject matter of the address in the fulfilment of the anticipations of those who have watched the career of the distinguished President for the past thirty years, not only as an inventor, but as a commercial pioneer in the production and application of power, particularly for marine purposes. Dealing first with the improvements in iron and steel as a constructive material, and with the copper, zinc, tin alloys and bearing metal alloys, he passes on to the design and form of ships, and to the main propelling machinery, boilers and auxiliaries, and points out that, while in later years in fast vessels the turbine has almost superseded the reciprocating engine, in spite of minor changes, the main features and functions of the mechanically-propelled vessel remain substantially the same to-day as twenty-eight years ago, and further, the conditions on which the existence of our industry depends have not greatly changed in the interval. The early history of the steam engine is traced from the inception of the idea of Roger Bacon, in the thirteenth century, that "engines of navigation might be made without oarsmen, so that the greatest river and sea ships, with only one man to steer them, may sail swifter than if they were fully manned," up to the building of the *Comet*, in 1812, the first really successful steamboat, the centenary of which we have celebrated this year. The invention of the separate condenser by James Watt was the chief factor in the success of the *Comet*, as it increased the duty obtained from coal by six times over any previous engine. Coming to the years 1840-60, when the surface condenser was developed, the progress of gradually increasing steam pressures and the construction of compound, triple and quadruple engines, is traced, so that to-day it may be said that the reciprocating engine is not now capable of much improvement, and is recognised as the most efficient machine for dealing with steam of high densities, but not for low densities, because with low steam pressures on the piston, frictional losses absorb most of the power, and also when it is attempted to provide sufficient cylinder capacity to carry the expansion down to low pressures, the engine becomes too bulky, expensive and fragile. For these reasons a 7 lbs. release pressure in the low-pressure cylinder and an expansion ratio of 16 has been about the limit practically attainable. The next point taken up is the utility of the turbine, which can take the exhaust of the reciprocating engine at 10 lbs. absolute and expand it down to 1 lb. absolute. This modified procedure is adopted in the combination systems of the *Otaki*, *Laurentic*, *Olympic* and other vessels, and shows a saving of 10 to 14 per cent. over quadruple-expansion reciprocating engines. As indicating the progress of the turbine engine for marine purposes, it is estimated that the total horse power of the world's shipping is about 26,000,000, of which about 8,500,000 is developed by turbines, being practically one third of the total amount. Dealing with the disadvantages of the high speed of the turbine relative to the low speed of the propeller, attention is drawn to the hydraulic reduction gear having a proved efficiency of 86% in small sizes, and an anticipated efficiency of 92% in large sizes; to the electric gear for which is claimed an efficiency of 92%, but the realization of which is not yet proved; and the mechanical gear which has actually realized at full power 98% efficiency. Reference is made to the installation of 6,000 horse-power turbo-alternators supplying current to electric motors on the propeller shafts for a 20,000 ton collier, now being built for the U.S. Government, such vessel to have a speed of 14 knots. Much interest awaits the result of this experiment from the point of view of obtaining a reliable comparative figure to place beside the results of the other two systems. The provision of mechanical gearing dates back to 1836 when it was used to gear up the screw from a slow-moving engine; even in 1850 the P. & O. liner *Simla*, having engines of 640 nominal horse-power, had a gearing of 2·75 to 1 of this character, so that after 75 years engineers are going back to a gear drive, but in the inverse sense, in order to reconcile the idiosyncracies of the turbine and screw propeller. Turning now to the superheater which was introduced in the days of low pressure and jet condensation, it will be remembered that 20 to 30% of economy of fuel was effected owing to the low pressure and consequent temperature of steam used. It was thus possible to obtain a large amount of superheat without risk of destroying lubrication and packings. The corrosion due to the salt deposited was so rapid that superheaters fell into disuse. The present position seems to be that owing to surface condensers of improved construction and feed filters, it is possible with reasonable care to exclude salt from

the boilers, and consequently well-designed superheaters are a practical success at sea and result in a considerable and important saving of fuel. Over 600 vessels of small or moderate size are now fitted with superheaters, mostly of the Schmidt type, and on some few years' working show a saving of coal of between 10 and 30 %, one line in particular, *viz.*, Wilson's, having thirteen vessels so fitted and giving excellent results. The structural parts of turbines subjected to high superheat are made of steel, because at temperatures over 550 F. cast iron gradually distorts and loses strength. The next subject dealt with is the internal combustion engine and it is shown that for comparatively small powers, as viewed by the marine engineer, internal combustion engines have not only proved satisfactory, but their economy of fuel is so great over the steam engine that the latter is now almost superseded. As the size increases, however, their relative superiority diminishes until in the cases of the largest steam units as compared with the largest internal combustion units hitherto constructed, there is little difference in the consumption of fuel between the two. It is found that as regards the weight and cost per horse power of gas engines a turning point is reached at about a 16-inch diameter of cylinder, beyond which the cost and weight per horse power increase rapidly with the size, and in the Diesel engine this point is reached at a still smaller size of cylinder. In the reciprocating steam engine this turning point only becomes apparent when a very much larger size and power of cylinder is reached, such as in large modern liners, and further in the turbine, this turning point is never reached except in the largest and most powerful vessels. These limitations involve a large number of cylinders for internal combustion engines, and although engineers might possibly solve the problem of transmission of power to the propeller, such solution would seriously interfere with the views of the naval architect. In discussing the relative position of oil and coal, the world's output of oil in 1910 was 44·45 millions metric tons, and of coal 1,100 millions, so that it is evident that by no possibility could oil displace coal for all purposes. The next point is, could it do so for motive power purposes, and in dealing with this question the President states the conclusion of Mr. Joseph Shaw, K.C., the chairman of the Powell Duffryn Steam Coal Company, Ltd., *viz.*:—"The motive power of the world would reqnire about 51·5 million tons of oil, while the whole oil raised is only 44·5 million tons, and the portion available for engine fnel after allowing for petrol for motor cars, lamp oil and lubricating oil, is only about 10 million tons. At best oil could only be used for 20% of the world's motive power, and it is improbable that it could do so much, because the price would rise far beyond 50s. per ton, which appears to be the price at which competition with coal is possible." A lower price for oil than 50s. seems to be needed to enable it to compete as fuel in internal combustion engines with coal burnt under boilers and modern steam engines and geared turbines. The concluding subjects dealt with by the President were gas turbines, the screw propeller and the rolling of ships, in each of which he set out some illuminating facts and conclusions. It is interesting to note that in the Presidential address of Mr. Summers Hunter, read at the Institute of Marine Engineers on October 14th last, and which we give *in extenso* elsewhere, there are many points of equal interest to those given by the Hon. Sir Charles Parsons in his address.

SHIPBUILDING AND MARINE ENGINEERING FOR 1912.

OUR January, 1913, number will be an enlarged and special issue. It will contain, in addition to many original articles by well-known writers, an exhaustive return of the vessels and marine engines built throughout the world. It is the most exhaustive list published and forms a complete record of the utmost use for reference. It should be in the hands of all those connected with shipbuilding, marine engineering and allied trades industries. The number has a rapid sale and orders should be placed now.



Journal "Neptune."

The above illustration shows a projected plan of the dock extension now under course of construction at Antwerp, also the new entrance below Fort la Perle, on the right bank of the river going from Flushing and Fort Philippe, on the left bank. The dry docks are placed near the entrance, and the left bank of the river is to be built up to form a quay wall for a considerable distance above and below the entrance. The ramparts are indicated by the dark line round the town. The river is also to be altered in its course to lessen the risks inseparable from the navigation of sharp bends. The whole scheme is indicative of enterprise, business acumen and a forward Government.

PORT OF ANTWERP.

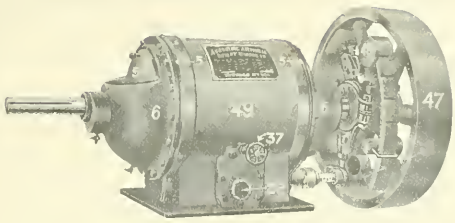
THE ground work of the dock extension, to which reference was made in a previous issue, is well advanced, and a survey of the whole of the present dock accommodation, with the berths fully occupied, shows the necessity for more wharfage to meet the immediate and prospective demands. The fine large barges, many of them motor-driven, extending over two of the hatches of the discharging steamer on the off side, and the excellent electrically-driven cranes on the wharf side, all aid in giving speedy discharge of cargo. Extending down the Scheldt, with an entrance below the bend of the river, which is a troublesome part to negotiate, and in the neighbourhood of which several collisions have occurred, the new docks will be a great convenience. Access from the town to the present docks is inconvenient, the distance is great and the roads leave much to be desired, whether for foot or vehicular traffic, and there is great need, undoubtedly, for adequate means of reaching the furthest away wharves, as those who work at the cargo have long distances to travel. The railway lines, however, for goods trucks, are convenient and well arranged to facilitate the transit of cargo.

Antwerp has greatly increased during the last twenty years, and its growing prosperity has led to a greater demand for space and house property to meet the increasing population. The tramway system is convenient and the trams run in all directions from the neighbourhood of the docks nearest the town, but to the range of the docks beyond there is great need for an extension. The cars run to long distances outside the Ramparts—to near Hoboken up the river and to the Frontier in the opposite direction. To meet the demand for more house property, the ramparts are being removed and the town limits extended for some miles beyond its present border, as rents have been increasing, owing largely to the congestion caused by the influx of people, in addition to the natural increase of population in a prosperous community.

The history of Antwerp is peculiarly interesting, and there are many monuments, memorials and buildings worthy of study by all whom business or pleasure calls to the port. Two of these memorials may be briefly referred to, for the lessons they convey are of far-reaching value. One is in the form of a specimen of the artistic work of a blacksmith who afterwards—working towards a goal, with the incentive before him of winning a bride, the father having made this a condition—became a painter whose name was honoured and whose merit was recognised. A statue erected in the Avenue des Arts keeps green the name of the artist and the example of what steady application and perseverance can do to overcome difficulties. The Plantin-Moretus Museum is also worthy of note, as it is not only a notable building, but contains exhibits through which can be traced the progress of printing and lithography from 1550, when Christopher Plantin settled in Antwerp and founded the firm of printers which remained in lineal succession for 300 years, each generation gradually adding to the property where the work was carried on, and preserving the tools and records, until the whole was, in 1876, purchased by the Municipality in order to retain the memorials for the nation. There are paintings by Rubens, Van Dyck and others—chiefly portraits; engravings, with the original copper-plates; an assortment of old books, MSS., sets of type in cases, and a printing press used in the early years of printing. The illuminated pages and headings are works of art, and there are many objects of taste and value preserved in several of the large number of rooms into which the museum is divided. The building is comprised of a series of houses and forms a square with a central courtyard. It is situated near the Cathedral, and may be visited many times without exhausting the interest attaching to it.

DEVELOPMENT IN AUXILIARY UNITS BETWEEN EXHAUST PIPE AND BOILER.—Mr. Wm. Weir read a very able paper on the above subject, on October 22nd, before the Institution of Engineers and Shipbuilders in Scotland.

THE "REINA VICTORIA EUGENIA" COMBINATION STEAMER.—Messrs. Wailes, Dove & Co.'s "Bitumastic" enamel has been applied throughout the double bottom, ballast tanks, engine and boiler-room tanks, and their petcrt "Bitumastic" covering to the tank tops.



AUGUSTINE ROTARY ENGINE.

A ROTARY engine, termed the Augustine Automatic Rotary, has recently been introduced at Port Arthur, Canada, and two have been installed with considerable acceptance, the results being favourable. One, of 20 H.P., is fitted in a steam laundry, the other, of 50 H.P., is driving the machinery of a wood-working factory and taking the full load steadily without noise. This engine is governed by either a centrifugal or inertia governor operating the automatic cut-off valve which cuts off the port openings as the load varies. There is also a by-pass valve for starting at any part of the revolution with the load on. There are two piston blades on which the steam acts, and throughout the revolution the steady movement is maintained by means of compensating balance rings, so that the piston, when the engine is working, floats in the cylinder while revolving. The inlet and outlet ports are so arranged that when the steam pressure due to expansion is reducing to a limit on the one blade, the other is receiving the initial pressure, while the torque is practically constant. The space occupied for the power developed is smaller in comparison to a Reciprocating engine or Turbine; it is as efficient and economical as either, and it can be operated by steam, gasoline or alcohol. The appearance of the engines can be seen from the accompanying illustration.

5. These are the cylinder heads or covers.
6. These are the ring bearing journals.
22. Inlet port to the automatic cut off valve.
37. By-pass valve for starting the engine with load on at any part of the revolution.
47. The flywheel carrying the centrifugal governor.
48. The centrifugal governor.
49. The complete illustration represents an engine which was tested at 41 B.H.P. with a steam consumption of 36·5 lbs. per B.H.P. per hour. The dimensions are: Length, 19 in.; breadth at base, 17 in.; height, 20 in.; full length of shaft, 48 in. The outside diameter of the cylinder is 17 in. Weight of engine, 800 lbs.

"TITANIC" ENGINEERING STAFF MEMORIAL.

This fund still grows apace, the latest reports from the centres being as follows:—

Institute of Marine Engineers, London, up to 26th October ...	£2,300 0 0
Southampton Committee (for the erection of a monument in Southampton), up to October 22nd ...	1,343 10 0
Liverpool Committee (for the erection of a monument in Liverpool), up to 22nd October, over	4,600 0 0
Total	£8,243 10 0

Institute of Marine Engineers.

PRESIDENTIAL ADDRESS BY MR. SUMMERS HUNTER AND PRESENTATION OF DENNY GOLD MEDAL.

MR. SUMMERS HUNTER delivered his presidential address at a meeting of the Institute of Marine Engineers, held on October 14th, afterwards presenting the Denny Gold Medal awarded to Mr. John McLaren (member) for his paper on "Wireless Telegraphy," read December 11th, 1911. The speech was as follows:

My first duty to-night is to thank you for having elected me as your president for the current year. It was an unexpected honour, and one that I very highly appreciate. I should never have considered myself particularly suited for this high position, but our indefatigable and persuasive secretary convinced me that it was my duty to accept it; in fact, he even went so far as to say that my experience and training were just what was required. Be that as it may, you have conferred upon me the highest honour in the power of the Institution. I value it greatly, and it will be my earnest endeavour to uphold, with your help, the high traditions of our former presidents, to maintain the reputation of the Institute and to help on its good work.

But, gentlemen, whilst my desire is strong to do this, the fulfilment is no easy task. Commencing on moderate lines, with no great ambition, beyond the welfare and improvement of the marine engineer, this Institution has, up to now, done noble work, but it has grown in every way, and there is more work to be done. We must progress; the necessity for this is to be found in the papers read and the discussions thereon. These indicate fully the increasing importance of the Institute, and the responsibilities of its officers and members in promoting the safety and prosperity of the overseas trade and commerce of the country.

Since this Institute was founded, in the year 1889, great changes have taken place in all that appertains to the carrying trade of the world, both by land and sea. The able and most interesting communication by our honorary secretary (Mr. Adamson) giving a history of the *Comet* and the advances in marine propulsion from the time of that vessel's first voyage, taken in conjunction with the Transactions of this Institute, is a record of the remarkable achievements of the marine engineer and the shipbuilder. Great and successful these achievements have been, and whilst we pay homage to the memory of James Watt, on the Clyde, and the birth and development of the steamship there, it is only fitting to remember the name of George Stephenson, once a colliery engineman, and eventually the father of the "iron road" and its locomotives. Watt was much interested in the application of steam to ship propulsion, and expressed surprise that nearly fifty years elapsed before steam was successfully applied to marine propulsion, and it was many years before Stephenson and others successfully applied steam to the conveyance of passengers and goods by road and rail.

Circumstances to-night are such that I am tempted to turn the pages back, and disclose a chapter of the past; but I must make the chapter a short one. Under somewhat exceptional conditions, my first experiences of steam were obtained at an early age, from engines working at some 4 or 5 lbs. pressure, and making 8 to 10 strokes per minute. The cylinders were open-topped and, instead of a piston rod, the piston was connected to a beam by a heavy chain, the other end of the beam being attached to pump rods directly over the pit-shaft. I need hardly say I refer to an old Cornish pumping engine. No one knew the age of this engine, but only that it had been reconstructed by Boulton & Watt, and by them fitted with their separate condenser and air pump. However, as it had no parallel motion, it must have been built before 1784—that being the year in which Watt invented the parallel motion. The old man who handled the mysterious gear, with its bellows for controlling the speed, seemed to be as old as the engine itself. That is over forty years ago.

To me, as to all here present the history of the steam engine, since that old engine was built, is something of a romance, and I trust you will pardon this reference to the engine which so fascinated my youth that to this day I vividly remember its working. It is about ten years since I saw it, but it was then doing useful work.

In engineering, as in most things, a great deal depends upon our point of view. There is the man who carefully and laboriously works on a scientific basis and establishes new principles. His research goes on for years and eventually the world at large benefits. Others take advantage of his work and make of it an industrial and commercial success. From the latter view, or the commercial aspect and the successful application of the results of research and invention, the subject is a very wide one, and of vast importance to such an Institution as this. Yet it is with some diffidence that I venture to address you to-night upon the many developments in connection with ship propulsion; it is too big a subject to enter upon in detail—therefore my remarks may appear brief and somewhat disconnected; nevertheless, I trust they will be of some interest.

There is much to show the slow progress of the early stages of modern naval architecture and marine propulsion. The early workers at the steam engine had little or no knowledge of engineering science or mathematics, and their hard work and indomitable perseverance brought them but a bare measure of monetary success.

The idea of a power-driven vessel is very old, but, as a matter of interest, it is not generally appreciated that Trevethick saw the coming of a steam-driven vessel built of iron, and realizing the necessity for dry docks, in the year 1809, he patented a floating dock, to be built of iron plates, and large enough to deal with vessels of 200 ft. long. It is nearly a hundred years since Samuel Brown fitted a gas engine to a boat on the Thames, but before this, something had been done in France—valuable experiments, showing the possibilities of the explosion engine, and the forerunner of the present-day engine of the same type. For over a century, the turbine was neglected, except as a hydraulic machine, until Sir Charles Parsons began his investigations and experiments, which were ultimately, after some twenty years of continuous labour, crowned with complete success.

The present-day results of these inventions are perhaps still more familiar to us. Trevethick's patent has been so developed that floating docks are now in use which can accommodate the largest of our modern leviathans.

The internal combustion engine has been improved by successive inventors, until, after slow progress, the discoveries of oil and familiarity with its use, enabled Dr. Diesel to develop the famous and successful engine known by his name. The economical production of power-gas, after being scientifically demonstrated, is now in successful use, and our late president (the Marquis of Graham) has by his work in the *Rattler* identified his name with the application of the gas producer and gas engine to marine propulsion, while only a few weeks ago Dr. Dugald Clerk recorded in his excellent paper, read before the British Association, the history of the application of gas to the turbine, but he said very little of his own valuable research work. The electric propulsion of vessels has so far been exploited chiefly by Americans, but the Clyde and the Tyne are both again to the fore in this new development.

I believe I am right in saying that the name of Mr. W. P. Durtnall will always be associated with the electric propulsion of ships, and for his valuable paper on the subject this Institution awarded him the Denny gold medal in 1909.

The success of the turbine, commencing with the *King Edward*, directly applied to fast vessels, has led to the adoption of it for the merchant steamer, where it can be successfully used in combination with the reciprocating engine, or with gearing. With the latter method, I am particularly im-

pressed ; in fact, it may be said that the reliability of mechanical gearing has been demonstrated, and there will be an extended use of it. The Föttinger apparatus has perhaps not been so definitely tested, but I venture to say that it will find a place and do useful work ; in fact, the use of some form of gearing—perhaps, in particular, mechanical gearing is likely to become more general, in order to secure a better propeller efficiency, in conjunction with a fast-running prime mover.

The geared turbine has now been at work on the *Vespasian* for, I believe, over two years, and the vessel continues to carry coal, as usual. The original pinions are at work, and I am informed that there is practically no wear, after some 50,000 miles steaming. Of vessels under construction, to be fitted with geared turbines, there are two passenger boats for Channel service, three ferry steamers on the Clyde, and on the Wear there is a cargo boat of about 1,700 h.p. Further there is a large passenger liner building in Japan, to be fitted with geared turbines. Altogether, I believe there is about 100,000 h.p. of gearing fitting and at work ; and in the course of time, experience will be forthcoming as to its use in warships. With reduction gearing, the full economy of the turbine is secured, together with the best propeller efficiency. I have had some experience of the *Vespasian* in heavy weather, and, as you are doubtless aware, there is little or no racing, whether light or loaded. The actual acceleration does not exceed 7½ per cent. No shock of the sea or pitching of the vessel appears to stop the turbine ; it simply screws steadily on at the speed you require, according to the ratio of the gearing, and practically as slow as you like in heavy weather. The result of this is that the motion of the vessel is distinctly easier, and a better steering way is maintained.

Before leaving the turbines, I wish to refer to a passenger steamer building by Messrs. Swan, Hunter & Wigham Richardson, Ltd., on the Tyne. This vessel is 480 ft. long, and is to be fitted with quadruple screws—the two inner screws being driven by four-crank triple-expansion balanced reciprocating engines, and the two outer screws by low-pressure Parsons' turbines, the combined horse-power being about 10,000. I believe a sister vessel is building on the Clyde, but will be fitted with similar machinery differently arranged. The results and comparisons of these arrangements will be interesting and valuable.

Superheating to-day is engaging considerable attention, and is worthy of our notice. Its early history is in your records and well known to most of the members of this Institution. Conditions have changed very greatly since superheated steam was used with much lower boiler pressures, and for this reason the relative economy of superheating then was greater than it is to-day, but the risks attendant upon the securing of this economy were considerable, in consequence of which superheating for marine work was practically dropped for many years. With higher pressures the freedom from accidents due to priming, or the accumulation of dirt or salt in the superheater, has led to its reintroduction, and this has been rendered more successful by being able to obtain lubricating oils suitable for the high temperatures, and also the better systems of packing for the pistons, valves and rods ; and I must not forget to mention the very necessary feed-cleaning apparatus. You see, these various details had been rendered necessary by the adoption of higher pressures and higher piston speeds, so that when a better system of superheating was discovered, we were in a position to take advantage of the improved details to which I have referred, and this has had a great deal to do with the successful use of superheated steam to-day.

There are now some 700 vessels of various sizes fitted with superheaters, and of these about 600 are owned on the Continent, and are nearly all fitted with the " Schmidt " type of superheater. Before this system came to be used for marine work, it had been successfully adopted for locomotive and land engines, on the Continent, and I believe there are now between 7,000 and 8,000 locomotives fitted with it, and of these there are fully 500 in this country. The economy of using superheated steam in locomotives is somewhat remarkable, and, as you will easily understand, depends very largely upon the length of the train journey. Twenty per cent. appears to be an ordinary saving, but I have heard of cases where it has been as much as forty per cent. On the Continent a passenger liner, about 800 ft. long, and of 30,000 i.h.p., is building, and will be fitted with these superheaters. This vessel will have twin-screw triple-expansion engines, and the consumption of coal will be from 10 to 15 per cent. less than with saturated steam. This saving can be effected in almost any triple-expansion engine and with perfect safety. In the earlier jobs, a bye-pass arrangement was fitted, so that, if required, saturated steam could be used, but experience has shown that this is unnecessary.

An interesting feature of this system of superheating is that it can be applied to almost any existing reciprocating marine engine, without structural alterations, and also, as the economy is practically certain, the same power can be taken out of the engines with less fatigue for the boilers ; in other words, the life of the boilers will be lengthened. This is an important consideration for the shipowners who are somewhat concerned as to what they are to do with their steam-driven boats, when the competition with the oil engine and other motors becomes more acute than it is to-day. My own feeling is that the majority of such owners have very little to fear that is, if both hull and machinery are modern and in fair condition, as, in most cases, the economy I have referred to can be taken advantage of. A ten or fifteen per cent. reduction in the coal bill is something that no owner can afford to overlook. We have no difficulty in working with 200° up to 250° of Superheat.

Superheating has been successfully applied to land turbines, and there is no reason why it should not be equally satisfactory when applied to marine turbines.

For vessels going long voyages, the quadruple engine, using steam at about 220 lbs. pressure, has already amply demonstrated its economy, and the increasing number of vessels which are being fitted with such engines is sufficient proof that shipowners are quite satisfied that, in adopting this type of machinery, they get a good return for the slight increase of capital involved. A somewhat frequently expressed objection to the quadruple is that it means another engine for the engineer to look after, and for the owner to keep in repair, but as the work done per crank is considerably less in a quadruple than in a triple of equal power, the wearing parts in well-designed engines are larger in proportion to the work they have to do, and, consequently, the wear and tear of quadruples is really reduced in proportion to the triples, and in many modern quadruples the repairing or overhauling is only that due to ordinary wear. A further development in the direction of increased economy has recently been effected by using superheated steam in quadruple-expansion engines. This arrangement has not yet been very largely adopted, and detailed and definite information is not yet to hand, but, so far as has been ascertained, it means a further economy of 7½ to 10 per cent., and when it is remembered that in quadruples using saturated steam the voyage consumption is frequently as low as 1·35 lbs. of coal per i.h.p. per hour, you will appreciate the importance of getting a further ten per cent. economy ; but this has actually been done, although, as already mentioned, the amount of data available is not sufficient to enable me to make a definite statement on the matter.

During the last few years, further economies have been effected, such as improved air pumps, a better knowledge of the principles of condensation, vacuum, feed-water temperatures, etc. We also know more about the economical working of auxiliary machinery. On the whole, I believe that, with these experiences at our disposal, the careful adoption of the most economical combinations, suitable for the power or size of vessel, will enable us to produce a steam-driven boat surpassing in economy anything that has yet been accomplished.

I will now endeavour to examine in a little more detail the advance and possibilities of the internal combustion engine. It is in its essence no new thing, for, about 230 years ago, gunpowder was exploded in a cylinder as a power producer, but probably due to the fact that the substances, gunpowder and gas, which the early experimenters employed, are apt to be somewhat uncontrollable, the records of these experiments are few and incomplete. We must not forget that the combustion of oil in a cylinder is not its sole possibility. It is used as a steam producer, as coal is, and so can be made to give us heat, power and light the great forces of nature. Oil has nearly passed through its reliability stages, and offers to those who have to do with its practical application an intensely interesting problem. The principles of the gas engine and the oil engine, and the leading features of their economy, are well known, and have from time to time been

increased by the economy of the installation, the home trade will not yet be ready to take advantage with us to-day. The development of the engine is not so rapid that already there is not many years' more experience of the oil engine than of the steam engine. Many of the ships designed for special purposes. Like the tug engine the oil engine was used for local purposes first and is now being very rapidly adapted to meet the wider use it is interesting to note that builders of the marine steam engine are in this coming to the front. Ocean-going and for short coastal voyages there are now some hundreds of oil-driven vessels at work chiefly of low power and low speed. Of ocean going vessels there are at present about six or 8,000 tons up to 9,000 tons dead weight at sea, four of which have engines on the four-stroke system and two or three on the two-stroke. But I believe there are at least twenty seven or twenty eight under construction of which seventeen have four stroke engines nine have two stroke single acting and two or three have two-stroke double acting the sizes of the vessels varying from 2,000 tons dead weight up to 15,000 tons.

Of electrically driven vessels there is the U.S.N. collier *Jupiter* of about 12,000 tons deadweight and one is under construction at the Wallsend shipyard of Messrs. Swan Hunter & Wigham Richardson Ltd. being of 2,400 tons deadweight capacity. The American vessel has Curtis turbines as a prime mover and the Tyne built vessel Diesel engines, the correct revolutions of the propeller being obtained by the use of the polyphase alternating current system. Within a year or two, we shall be able to make a practical comparison of all these systems.

There is an interesting and important problem in connection with marine Diesel engines and that is the question of propeller efficiency. Up to now it would appear that the economy of the Diesel engine is so great that a considerable amount of propeller inefficiency can be disregarded. I have but little doubt that in the near future the revolutions of the oil engine will more nearly approximate to those of the steam engine and then the oil engine will show a still greater economy.

The superiority as a heat engine of the internal combustion type is undisputed, but we cannot afford to limit our consideration to that feature only. There is the question of reliability, and this also applies to other methods of propulsion. The two essential tests of this are continuity of running at an intended speed, and ability to stand up to the stresses of heavy weather. For the former, we can test on shore, but for the latter although apparatus can be fitted to an engine to produce a motion closely resembling racing in a heavy sea the only really adequate test must be made under severe conditions on the open sea. This may seem obvious and elementary. Assume that the conditions are such that the vessel cannot be driven at its normal speed, without serious risk of having the decks swept and hatches broken in; speed must then be reduced according to circumstances, sometimes so far that only steering way is maintained. Then comes the real test for the engine, although, gentlemen, this bald statement neither describes adequately what takes place, nor sufficiently indicates what has to be provided for. Much less can any bench test, however manipulated, really tell us what may be happening to the ship. I repeat, we must observe the actual behaviour of the ship and engines under the most severe conditions at sea.

As regards the different cycles on which Diesel engines can work attention is at present for marine purposes confined to three; the four stroke cycle and the two-stroke single and double acting. Each has its advantages, and will have its class of vessel to which it is particularly suited. Thus cargo boats up to about 4,000 horse-power are most economically run on the four-stroke system. For although these engines are a trifle bigger, heavier and somewhat more costly than a two-stroke of the same power yet they effect a saving in fuel economy of some ten or fifteen per cent. It is, of course, obvious that an engine must have given satisfaction on land before it is tried at all at sea. In the early days of the marine oil engine, many people held the opinion that the engine must be double-acting, for considerations of space and economy. Many experiments have been made, and so far, up to certain sizes the results all favour the single-acting engine. However, at least one firm on the Continent has been successful with experimental engines of the marine double-acting type, and this firm is now building very large ones. Experiments are now being made in this country with a combination of internal combustion engine and steam, the exhaust gases being used in a special boiler for raising steam, but I think the time is hardly yet ripe for this, and a longer experience with the marine internal combustion engine is first necessary. Some good non-stop runs have lately been made by oil engined vessels but I believe the present record is held by a four-stroke engine in the vessel *Scandian*, which made a non-stop run of nineteen days from Aden to Sabang.

As to the final results of these labours, it would at present be rash to indulge in prophecy, but I suggest that, although shipowners may at present be somewhat bewildered, yet the various methods of propulsion will eventually find their special uses.

The economical position of the oil engine is entirely controlled by the price of oil; this should vary in the way that coal does, due to cost of production, carriage and storage, but under all circumstances, and assuming the merits of the propelling engines to be equal, then it has been demonstrated that the cost of oil should not exceed three or four times the cost of coal. At a recent meeting in Newcastle of the North East Coast Institution of Engineers and Shipbuilders, the comparative costs as between the oil engine and the steam engine were fully discussed, and it was there demonstrated that for an ordinary cargo boat, using bunker coals at 15s. per ton, the cost of oil should not exceed 45s. This was taking the consumption of coals per i.h.p. per hour at 1·6 lbs., which I think you will agree is on the high side. But note that these comparisons were made in connection with the ordinary cargo steamer; for an oil-carrying vessel the conditions may be entirely different in fact, so much so that it may be absolutely necessary to use oil, either directly or indirectly for propelling the vessel. Certain it is that wherever oil is produced, either naturally or by manufacture, or wherever it can be secured in the same way that coal is, and at reasonable prices, under these conditions there will be an increasing demand for the oil engine, both for sea and land purposes. At present, the circumstances connected with the supply of oil are somewhat peculiar. I don't think we have ever experienced the like with coal. When the conditions become normal (as they assuredly will do) then the competition will assume a different form and true economy will be the result.

It is an important and wide subject, and I feel that I have but inadequately touched the fringe of it; and after all, what is this wide subject of such enthralling interest? Power, its production and its application—just the work of the engineer. The original definition still holds good—the converting of the forces of nature to the service of man, and these forces, though bestowed upon us most generously and placed at our disposal in a most lavish manner, yet they must not be wasted. Healthy competition leads to economy. Heat is the great natural power, the economical use of which is our work. The various methods of propulsion to which I have briefly referred simply indicate the general desire and necessity for the more economical use of heat as applied to marine propulsion, and produced by coals and oil.

Much has been written and said about the motor or gas driven warship, but as yet little has been done, beyond realizing the advantage of a deck free from funnels and easily protected from attack by air craft. Before long, we may see warships of all sizes, specially designed for local waters—say, the North Sea and round the coasts of Northern Europe; and similarly for other countries and seas, leaving the long voyage or ocean-going warship to be something as at present, of a different design altogether. So far as this country is concerned, I hope we will not lag behind. If these special vessels are to be oil driven (as is more than likely) then we should be up and doing. But how does the cost of oil affect the warship? I can only put it in this way, that if it is possible to produce a warship with a clear deck, such as I have indicated—whether that vessel is driven by coals or oil—it will be the superior fighting machine, and such being the case, the warship and the merchant vessel are on an entirely different basis, so far as the cost of oil is concerned. Private enterprise cannot always be expected to do what is necessary to demonstrate what is required for the safety of these islands and the preservation of our Empire. I have no hesitation in saying as others have said, that once the position is understood, and fully realized, the country and the Empire will do the rest.

I now wish to refer to some necessary improvements in our methods of manufacture. For instance, in our foundries for a long time probably fifty years our ways have been somewhat crude. We have all looked upon the moulder as a skilful workman. His methods and shop practices have been handed down practically from father to son; and for generations we have been able to produce castings equal to the requirements of the steam engine. The improved manufacture of iron, followed by steel, has given us a material equal to the requirements of the modern steam boiler, up to almost any pressure. Now, the high initial pressures and temperatures of the internal combustion engine necessitate, where castings are required, a better and more reliable material. Further, we must be able to maintain the quality of the material. The knowledge that brass and similar metals will not stand these high temperatures has simplified matters considerably, and as a result of much research and exhaustive experiments, the chemist and metallurgist have shown us how to produce these metals; they have given us valuable advice, have shown us what is necessary for the improvement of our foundry methods; and now a well-equipped laboratory, fitted with the necessary testing apparatus, and all under specialists, is an essential department in a modern engineering works, where raw materials are largely used and accurate results are required. For instance, certain brands of cast iron are necessary for special castings, but it is just as difficult to secure a regular quality of pig iron from the blast furnace as it is to produce what we require from the foundry cupola, therefore the proportions of special brands of iron vary from time to time, and the time-honoured basis known as good, clean scrap is giving place to a scrap of a known quality, in other words, for these special castings you use scrap of your own making. A uniform quality of coke is important, also the regular working of the cupola, consequently, the analyses of materials must go on continuously. Reliable records must be kept. In this way, a control over the products of the foundry is obtained, and much that only a few years ago was a mystery to the moulder and those in charge of the foundry, is becoming common knowledge to the intelligent workman. In respect of modern methods such as I have referred to, the Continent gave us the lead, but now, I venture to say we are overtaking our competitors. These are but a few words in connection with an important part of engineering progress, and I wish to recognise to the fullest possible extent the information we have received through the medium of various scientific institutions—particularly the Iron and Steel Institute, and the more recently formed Institute of Metals. It is only those who are practically in daily touch with these matters who appreciate our great indebtedness to the institutions I have referred to.

At the risk of being accused of repetition, I wish to draw your attention to the valuable information and experience which become public property through the medium of the papers read before these institutions by our great scientists, and it is left to our discretion to make the best possible use of this knowledge. Personally, I have often thought that these institutions were well deserving of more support than they receive from the manufacturing engineer.

Gentlemen, the whole subject is fascinating and teeming with problems, but time is limited. I have referred to matters of which a general review is occasionally necessary, and now I come to something equally important, and a question which is brought home to us by the diversity of ideas which I have endeavoured to deal with—that is, the education and training of the engineers of the future. They have to do the work and to solve all the problems which these changes call for. The subject divides itself into two main parts—the general education of the coming generation and the training of the coming specialist.

The first question is always engaging the attention of our scientists and educationalists. You will remember that, at the conferences held by the Institution of Civil Engineers, some two years ago, a variety of opinions was expressed as to the best method of solving this very vital problem. Except in the broadest outlines the necessity for a good general education, the employment of education for mental training and such points, opinions were, I think, very much divided, particularly on the important subject as to the order in which college and practical training should be taken. For instance, some attach greater importance to scientific than to practical training, but I am very strongly of the opinion that a lad who can take advantage of the best possible training should have at least a year in the shops immediately after leaving school. Not only would this enable him to decide as to his fitness for the profession, but by his work there he would get to know something about the different materials used, the uses and details of the machinery he is engaged on, and the importance of accuracy. Then, when he takes up college work, he will be better able to understand the lectures. In dealing with this question I am bringing to bear upon it, I think, a considerable amount of experience. The subject is one which has interested me for many years, and I have endeavoured to watch, and profit by, the changes that have taken place from time to time in our educational systems, and particularly with regard to engineering matters. It has been pretty generally agreed that our young men should have every possible educational facility, and they should be encouraged to take advantage of these facilities. I regret to say the percentage who do this is disappointingly small; this I cannot understand, as there never has been a time when there was a greater demand or a better future for young men of sound training and ability. I can assure all those who are at present being trained to become marine engineers, that these new developments are being carefully watched by shipowners, who will be prompt to take advantage of any real economies that can be effected in working their ships, that all these new problems require the most careful investigation. Great as have been the recent changes and developments, they are assuredly only stepping-stones to something greater. In an engineering works the apprentices appear to be divided into two classes; those who take advantage of all the facilities we can give them, and who work conscientiously in the shops, and out of them—thus we get a small proportion of clever young fellows who will undoubtedly rise to all that is required in the future. Then there is the other class who will eventually become our skilled workmen. We must give our attention to all, because it is just as necessary to have thoroughly skilled and well-trained workmen as it is to have the more highly educated, a number of whom will take more responsible positions. We speak of a general training in engineering, but this is very difficult to define. We are coming to a time of specialization. In marine work the necessity for this is apparent when you consider the various types of machinery that may be dealt with in a single vessel, and for those who are to take a leading or responsible part in designing or carrying out this work, I consider that our methods are equal to, and will very soon surpass, what is being done in other countries. For instance, I have apprentices in our works now who came from schools where, at the age of fifteen or so, they go on the science and engineering side for three years. At the age of eighteen or nineteen, these lads are well grounded in science; they have had experience in the running and testing of steam engines, gas and oil engines, turbines, electrical apparatus and even a certain amount of practical training under skilled workmen. This system is not sufficiently understood, and there are only very few schools equipped for this work. Please remember that the general education goes on all the time. I have found from experience that the lads who come from these schools and colleges are thoroughly well grounded. It is not generally known that some of our ordinary public schools are now recognised by the Board of Trade, and 66 per cent. of the time served on the science and engineering side—after the age of fifteen, stands towards the apprenticeship time required by the Board of Trade. The training of such young men after leaving school is a matter of importance and of great interest. I have got the best results from the lads who, after leaving school, go into the shops for a year, and after that divide their time between technical colleges and the works. Of course, this is a system that cannot be applied to the ordinary apprentices; at the same time, ordinary apprentices can take advantage of the system by qualifying at evening classes. With regard to this sandwich system, I believe six months in the works and six months at college for three or four years would be found, on the whole, to give the best results. I am dealing now with mechanical engineering as quite apart from civil engineering. For the majority of apprentices who have to learn a specific trade, I believe more can be done in the future than we have ever attempted in the past. I have found a certain percentage of apprentices quite deserving of special education or training in practical work and in the future we will have to give more attention to this for more accuracy is being called for, and we must

produce skilful workmen as they can make the best and most use of the machinery and apparatus in the works. I have the greatest possible admiration for the mechanic who is able to turn his hand to any job that may be required about an engine, but as with the leaders so with the workmen men of special training will be required, and it behoves us to look well to it.

I consider that the graduate section is a most important part of our institution and one to be encouraged, for we are doing a great deal for the future of our profession if we can get our young fellows to join and take an interest in the Institute and a part in its work.

The work of this Institute is closely identified with the prosperity of the shipping industry, but suitable and central premises have been found necessary. A site has been secured in the city, near the Tower Bridge. The whole scheme is well known to the members, and as I said at the beginning there is a great work for the Institute to do in the future. The new premises are absolutely necessary for the carrying on of this work. Our best thanks are accorded to those shipowners shipbuilders and engine builders who have generously subscribed to the building fund or promised to do so, and it is hoped that others recognising the importance of the work will support our endeavours in a similar way. The new accommodation will be of an attractive and useful nature. Ample engineering literature including the latest text-books will be at the disposal of our members. We hope to bring the library up-to-date, and with these facilities we may with confidence look for a large accession of new members. Those making use of the Institute will find it a great advantage in being able to at once secure the latest information about all the new developments to which I have briefly referred. When the organization is complete, we feel sure that the work which has gone on so successfully for so many years will be extended and go forward on a broader basis and with a wider sphere of influence.

Our Transactions are a most valuable educational medium and whilst they reach all our members in course of time, in some cases members who are at sea, have the Transactions sent to their home addresses and therefore have to wait until their return to the home port, unless they specially desire the Transactions to be sent to meet them. Consequently it is worth their consideration whether some arrangements could not be made whereby the Transactions would reach them in foreign ports.

I take this opportunity of asking every member of the Institute to use his best endeavours to make its benefits known and to forward its work by introducing new members.

Before concluding, I feel that I must say a few words about our brother engineers who went down with the *Titanic*, and also to record our sympathy with the bereaved ones. The engineers were at their posts to the last, and surely no one expected they would have acted otherwise. It was just part of their day's work! As you are aware, efforts are being made to provide a suitable memorial, or memorials, which will be a permanent record of their devotion to duty. I cannot enter into the details of the various proposals, but the one which appeals most strongly to me is the founding of an institution which will provide for the widows and orphans of sea-going engineers. A suggestion has come from an engineer in the Far East as to a home or a school forming part of the scheme. This proposal I entirely sympathize with. The fund being raised by the members of this Institute now reaches a total of £2,230, and more will come in. I don't know the actual position of the other funds, but it would appear that altogether a sum sufficiently large to endow an institution such as I have referred to ought to be raised. Can anyone think of a better or more kindly way of perpetuating the memory of the engineers of the *Titanic*? I cannot; and if we will look far enough ahead and think of the usefulness of such an institution and the benefits it would confer upon those requiring its help, then I venture to hope that there will be only one reply, and that will be to join forces as far as ever possible and carry the work to a successful issue.

A vote of thanks was heartily accorded to Mr. Hunter on the proposal of Mr. J. T. Milton (chairman of Council), seconded by Mr. John McLaren (Member of Council).

A FOUR-SCREW COMBINATION STEAMER, "REINA VICTORIA EUGENIA."

On the 20th of September an unusually interesting event took place in the launch of the liner *Reina Victoria Eugenia* (Yard No. 884) from the Neptune Yard of Messrs. Swan, Hunter & Wigham Richardson Ltd. This vessel has the distinction of being specially equipped with a combination of turbine and quadruple expansion engines and four propellers. She has been built for the Compania Transatlantica, and is intended for the passenger service between Barcelona, Cadiz, and Central and South America. The steamer is 480 ft. long, by 61 ft. beam, and is 35 ft. 9 in. in depth and is intended to attain the highest class in Lloyd's Register, as well as in that of the Registro Italiano, so that she may carry emigrants. She will have accommodation for no less than 2,100 passengers, including 250 first-class, 100 second-class, besides third class and emigrants. The first-class passenger accommodation is placed amidships and there are two *de luxe* suites. The vessel, which is fitted for wireless telegraphy, is arranged to carry four or more guns if used as an armed cruiser. The vessel is to have a speed of 17½ knots, and her four propellers will be driven the two inner ones by four-crank triple-expansion balanced reciprocating engines, while the outer screws will be driven by two low-pressure Parsons turbines, taking their steam from the low-pressure cylinders of the reciprocating engines. The builders, as is well known, led the way in introducing the Yarrow, Schlick and Tweedy four-crank balanced engine, the special advantage of which is its freedom from vibration. Messrs. Swan, Hunter and Wigham Richardson, Ltd., too, were among the first to take up and advocate the combination of reciprocating and turbine engines, on account of the considerable saving in fuel. But their investigations and experiments led them to prefer the arrangement with four screws rather than that with three screws. The four-screw arrangement was proposed by them to the French Transatlantique Company and adopted by that Company, with successful results, in their Atlantic steamer *Rochambeau*.

EARLY CLYDE MARINE ENGINEERING.—At the Marine Repair Works of the Clyde Trust at Renfrew, there has recently been carried out a dismantling job of more than ordinary interest, *viz.*, the removal of the engines from the hull of the Clyde Trustees' old paddle-tug *Clyde*, built sixty-three years ago, which has recently been superseded by a new screw steam tug. Mr. Wm. Brown, managing director of Messrs. Wm. Simons & Co., ship and dredger builders, of Renfrew, has presented the old engines (as a gift illustrative of the Clyde's early engineering) to the Renfrew Town Council. In his communication conveying the gift, Mr. Brown states that he got possession of the engines from the Clyde Trust, of which he is a member. The tug was built at Renfrew sixty-three years ago by Messrs. Henderson and Sons, and was engined by Messrs. A. & J. Inglis, Warrock Street, Glasgow. His father, the late Mr. Andrew Brown, Provost of Renfrew, was at that time manager and draughtsman to Messrs. Inglis. The engines were the first made of the disconnecting type, and besides being a matter of historical interest to engineers as a relic of early engineering on the Clyde, they had a special attraction to the community of Renfrew on account of the vessel having been built in the Royal Burgh and the late Provost Brown having designed the engines. The gift has been duly accepted and will be erected and suitably protected on a suitable site within the town of Renfrew.

THE INSTITUTE OF MARINE ENGINEERS.—The annual dinner of the Institute will be held on the 8th of November in the Connaught Rooms, Great Queen Street, Kingsway, London, W.C.

AMONG THE TECHNICAL SOCIETIES having their opening meetings for the Winter Sessions during the past month of October were:—Institution of Mechanical Engineers, October 25th; Junior Institution of Engineers, October 23rd; Manchester Association of Engineers, October 12th; N.E.C. Inst. of Engineers and Shipbuilders, October 25th, and the Graduate Section, October 26th; Institution of Engineers and Shipbuilders in Scotland, October 22nd.

THE SPANISH BATTLESHIP "ESPAÑA."

THE three battleships of the "España" class, the *España*, *Alfonso XIII.* and *Jaime I.*, now building in Spain, under the direction of the "Vickers-Elswick" syndicate, represent a type which might be classed as second-class "Dreadnoughts." The contract for their construction was secured in open competition for the best design within given limitations, the times of building to be four years, five-and-a-half years, and seven years respectively from the date of contract. During the first two years, 75 per cent. of the workmen engaged were to be "foreign," and from then onwards only 50 per cent., the remainder being Spanish.

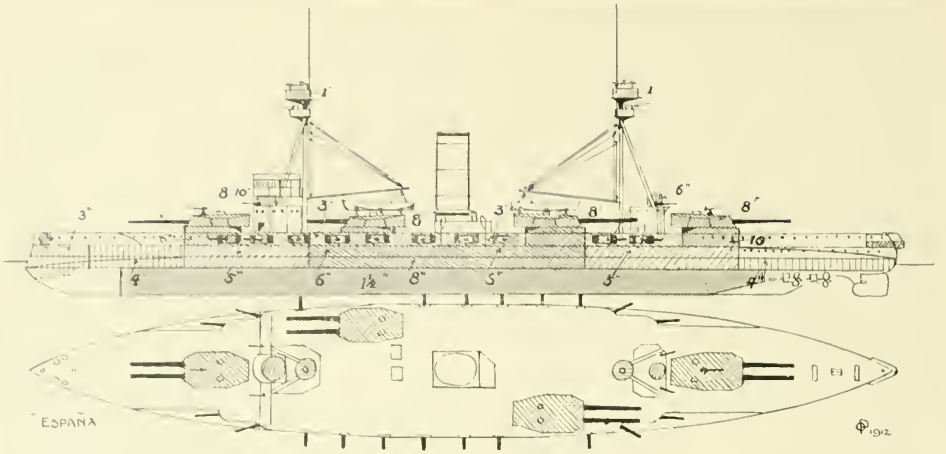
The type represents an interesting attempt to produce an all-big-gun ship upon moderate dimensions, the displacement being 15,700 tons, length (water-line) 439½ feet, beam 78¾ feet, and mean draught 26 feet. The armament consists of eight 12-in. 50 calibre guns in four twin turrets, and twenty 4-in. guns mounted in a main deck battery, together with four smaller pieces and three submerged torpedo tubes. Particulars of the competitive designs sent in have not been made public, otherwise it would have been interesting to have seen what the different European firms could have produced upon the displacement and cost limits. Suffice to say that the present design was accepted for all-round excellence, taking armament and gun-handling speed, protection, coal supply, speed and gun-disposition into consideration.

The four turrets are distributed after the "Indefatigable" style, the amidships couple being widely diagonal with extensive cross-deck arcs of fire, so that all eight guns can be trained on either beam. Their height above water is 25 feet, the mountings being protected by 10-in. bases, the gun-houses having a varying thickness of seven to eight inches.

As can be seen from the deck plan, the 4-in. guns are differently spaced on each side according to the position of the 12-inch guns, the two guns at either end being recessed to secure axial fire. The battery is lightly protected by a 3-in. armour wall and bulkheads—a thickness insufficient to keep out projectiles of any size, and just enough to burst shells so that the maximum effects will be felt in the battery. A better distribution would have been to have ranged the guns along a flying deck, as in the *Lord Nelson*, or in the superstructures and on the turret tops, where a higher command would have obtained, and their positions, being more isolated, would have been less likely to suffer *en masse* from the effects of a single shell.

The placing of a secondary battery is always a difficult problem to solve. Our own ships have had their 4-in. guns widely separated and usually unprotected, except in the case of the "King George V." class, where light casemates have been fitted, it being laid down that light guns will not be fought in a general action, and in any case be wiped out if hit by a 12-in. projectile, so that the weight expenditure of light armour upon them is not justified. A thin casemate to each gun does not, of course, aggregate so much as a continuous armour wall, so that the

The Spanish Battleship *España*.



Plan of the Spanish Battleship *España*.

total weight of the 4 in. gun protection in the "King George V." class is not a serious factor. But in the *España* it would seem that the fighting efficiency would be improved by leaving the 4-in. guns without armour, as in the latest American ships of the "Oklahoma" class, and increasing the protection on the water-line. This latter consists of an 8-in. belt amidships, tapering to 4 in. at the bow and stern; along the lower deck side the armour is 6 in. thick, and above is the battery. A 1½-in. protective deck encloses the vitals of the ship, while below the water-line the hull is covered with armour of similar thickness, the extent of which can be gathered from the plan.

There are two conning towers, that forward being 10 in., the one aft 6 in. thick.

The machinery consists of four sets of Parsons turbines actuating four screws, the horse-power being 15,500, and the designed speed 19·5 knots. Steam will be generated in Yarrow boilers, and coal to the extent of 900 tons normal and 1,900 tons maximum represents her fuel capacity, giving a nominal radius of 5,000 miles at 10 knots.

As regards the appearance of the ship, there is little to comment upon; the single funnel, tripod masts and lack of superstructure give her a distinctive profile easy to recognise, while the stowage of the boats upon the amidships turret-tops is unique in British practice.

Range control will be practised from thinly-armoured stations on the tripods, unless these are replaced by pole masts in the interim, and the range finders mounted on the conning towers, as is being done in the newest British ships.

Owing to the deadwood aft being cut away, the *España* should prove a handy ship; forward the free-board is 18 feet, the big guns being 25 feet above water, and the secondary pieces 14 feet, a height insufficient to assure their being fought in all weathers.

In the following table the *España* is compared with the *Michigan*, the only other ship of about her tonnage:—

	España.		*Michigan*
Displacement	15,700 tons	..	16,000 tons
Dimensions	439 · 78¾ × 26′	..	450 × 80½ × 24½′
Complement	700 men	..	869 men
Armament	8 12″	..	8 12″
	20 4″	..	22 3″
	8 small	..	2 smaller
	3 T. Tubes	..	2 T. Tubes
Protection—			
Belt	8″—4″	..	Belt, 11″—9″—1½″
Lower deck	6″	..	10″—8″
Deck	1½″	..	3″
Main deck	3″	..	Nil
Under water	1¾″	..	Nil
Conning tower	(a) 10″	..	(a) 12″
	(b) 6″	..	
I.H.P.	15 500	..	16,500
Designed speed	19·5 knots	..	18 5 knots
Machinery	Turbine	..	Reciprocating
Coal	900/1900 tons	..	900/2,380 tons
Launched	1912	..	1908

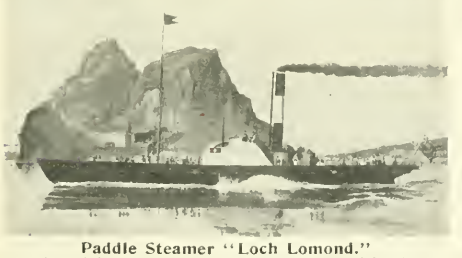
The two ships represent the "all-centre-line" and "*en echelon*" theories for eight guns, and offer a wide field for comparison. With all her big guns on the same level, the *España* possesses a more uniform command than does the U.S. ship, which was fully dealt with in our issue of July, 1908. She can also fire six guns ahead or astern, on paper, against the four of the *Michigan*, but on the beam the latter has the advantage, as all her eight guns have uninterrupted arcs of training in contrast to the limited cross-deck bearing of two of the *España's* guns.

The U.S. ship has better w.l. protection and more armour on her 12-in. guns, an open secondary battery of 3-in. guns, a larger coal supply, a knot less designed speed, which, however, counts for little, as twenty knots has been reached on trial, and presents a bigger target. She has, however, "soft" ends, the belt being 1½ in. aft and forward to within some 22 feet of the bow, leaving the cut-water open to shell destruction, in which case her speed and stability would be seriously impaired. The secondary battery of 14-pounders is distributed well up above the w.l., but is too light to destroy modern torpedo craft of any size.

was floated into No. 2 Dock. When the water was pumped out, a slanting gap about 3 feet wide was revealed in the vessel. On October 5th, torpedo-boat *No.* 11, of the Nore Defence Flotilla, was taken in hand for the repair of damage sustained on her starboard side forward, a rent some 7 feet in length and from 12 to 18 inches in depth having been made in a collision. The vessel was caught by a strong tide as she was going alongside a coal lighter in the Medway. The vessel was undocked on October 18th, and has now resumed duty. Torpedo-boat *No.* 16, which had been in hand for a refit, has proceeded to Harwich to rejoin the Eighth Destroyer Flotilla, and torpedo-boats *Nos.* 31 and 32 have also completed refitting. The submarine tender *Alecto* arrived towards the end of September from Dundee, having in tow Submarine *C*22, which had been detached from the Seventh Submarine Flotilla to go into dockyard hands for the repair of machinery defects. Three other submarines, *C*2, *C*5 and *C*6, came in from Harwich for refit on October 12th. The battle-cruiser *Lion*, flagship of Rear-Admiral Bayly, commanding the First Cruiser Squadron, was taken into the new Medway floating dock on October 2nd. Having had her underwater fittings examined and her hull coated with preservative composition, the vessel was refloated next day, and left at night for Cromarty to rejoin the squadron.

Pembroke Dockyard.

The second and last propelling turbine for the cruiser *Amphion* arrived here on October 5th from Messrs. Parsons', and work is being expedited so that the vessel may be ready for her steam trials in December. November 25th was the date provisionally fixed for the trials, but it does not appear possible to get her ready by that time. Material for the construction of the cruiser *Nottingham* has been coming to hand fairly rapidly during the past few weeks, and the rate of progress of the vessel has been accelerated, it having been found possible to employ more men on her. The sternpost has not been delivered at the time of writing, and therefore it has been impossible to complete the framework at the stern, but in other parts the framework is in place. The external form of the ship is apparent, and differs little from that of the *Fearless* and the other vessels of the class. Her displacement is to be 5,640 tons. Work on the *Fearless* is in an advanced stage, and her turbines are expected at the end of the month, which is much sooner than anticipated. We are to build one of the new light armoured cruisers, but it was not until the beginning of October that it was certain that such would be the case. It does not appear, however, as if the new vessel can possibly be laid down here before Christmas. The rumour that an oil-ship is to be built here proves to be correct, but nothing much is known as to her size, save that she will be about 280 feet long. It is not known either how much is to be spent on her construction. The vessel will, it is understood, be built on No. 5 ship. Altogether, the prospects of the yard are a great deal brighter than they were at the beginning of the year. The refits of the destroyers *Havenev* and *Ouse* are nearing completion.



Paddle Steamer "Loch Lomond."

In view of the article on the *Comet* Centenary Celebrations on the Clyde, contained in our issue of August, the above illustration will be of interest. It is reproduced from a painting of the paddle steamer *Loch Lomond*, the first steamer built by the firm of Messrs. William Denny & Brothers, of Dumbarton. The vessel was built in the year 1845.

THE PORT OF LONDON.

THE Port of London Authority have now accepted tenders amounting to £2,350,000 for dock extensions and improvements, the more important of the work immediately contemplated. These comprise the Albert Dock (South) extension and improvements at the East and West India and London and Tilbury Docks. The first is the new deep water dock to the south of the existing Albert Dock. This basin will give accommodation for large liners within the metropolitan cartage area and will be 65 acres in extent and have an ultimate depth if necessary of 38 ft. The entrance lock will be 800 ft. long by 100 ft. wide with a depth of 45 ft. on the outer sill. The western dry dock at the Albert Dock is to be enlarged up to 575 ft. long and 80 ft. wide. There will be a passage 100 ft. wide between the new South Albert Dock and the existing dock. The electrically-driven pumping plant, which will be utilized also for permanently increasing the depth of the water in the existing Albert and Victoria Docks by 2 ft. 6 in., is already nearly completed, and is said to be the largest of its kind in the world. The new dock will take four years to construct and will be seen to be a valuable addition to Thames Dock facilities. As every one of the available berths at Tilbury is said to be occupied, a length of 2,000 ft. of quayage is to be provided within two years for vessels of the largest dimensions, and these quays will form part of the general scheme of extension to be undertaken later on. The East and West India Docks are to be modernized so that vessels of 8,000 and 9,000 tons can enter. The East India Dock of 32 acres will have an increased depth of water, the quays will be widened and crane equipment supplied with sheds. Similar provision is also contemplated for the West India Dock. In the case of the London Dock the passage from the Shadwell entrance will be widened and deepened. Five additional vessels will then be accommodated, and the water area of 20 acres in the Western Dock kept up to the highest possible level. The contractors are Messrs. S. Pearsons & Sons, Ltd.

LLOYD'S REGISTER.

THE annual report of Lloyd's Register of Shipping for 1911-12 has just been issued, and states that at the close of the year ended 30th June, 1912, 10,445 merchant vessels, registering about 21⅝ million tons gross, held classes assigned by the Committee of Lloyd's Register, and during the year, classes were assigned by the Committee to 684 new vessels, their registered gross tonnage amounting to 1,468,166 tons. The development of engines of the Diesel type has been watched by the Committee with great interest, and the various problems attendant on the introduction of the internal combustion engine into sea-going vessels have received the close attention of Mr. Milton, the Society's chief engineer surveyor, who has made a special study of internal combustion engines. There are at the present time being built under the supervision of Lloyd's Register, Diesel engines for thirty-four vessels, twenty-three of which vessels are of tonnages ranging from 2,000 to 10,000. These engines are of various types, including four-stroke and two-stroke cycles single-acting, two-stroke cycle double-acting, and also of the " Junker " type, and they range in power from 1,750 to 120 brake h.p. per set. The results of the working of the engines of the motor vessel *Vulcanus*, fitted with a four-stroke cycle engine, have been so satisfactory to the owners that they have now under construction five other vessels of considerably larger size and with Diesel engines of greater power, which will be fitted by the same engine builders, the Nederlandsche Fabriek van Werktuigen en Spoorweg-Materieel, of Amsterdam. During the year Messrs. Burmeister & Wain, of Copenhagen, have completed the oil-engined vessels *Selandia* and *Fionia* (now named *Christian X*). These vessels, which hold the Society's highest class, are of 5,000 tons each, and are fitted with Diesel engines of the four-stroke cycle type. The *Selandia*, after visiting London and Antwerp, has made a successful voyage to Bangkok and thence to Copenhagen, where she was examined by the Society's surveyors, who reported that her engines had given satisfaction and needed only some minor repairs. The builders of these vessels have

in course of construction similar engines for six twin-screw vessels, two of them being of higher power than the *Selandia*. These are all being constructed under the Society's survey. The official trials of the oil-engined vessel *Fordonian*, of 2,000 tons gross, have recently been carried out with successful results. This vessel which has been built under the Society's inspection by the Clyde Shipbuilding and Engineering Co., Ltd., is fitted with Diesel engines of the two-stroke cycle type, of 750 brake h.p., and will be assigned the Society's classification, "For Canadian Lake service." No fewer than eighty-six steamers of upwards of 5,000 tons each have been classed by the Society during the year under review. At the present date, there are in hand fifteen vessels of 12,000 tons and upwards intended for the Society's classification, including the *Aquitania*, of 45,000 tons. The tendency towards the introduction of modifications in recognised forms of ship construction still continues, and the many proposals in this direction receive the careful consideration of the committee. An increasing amount of tonnage is being built upon the Isherwood system of longitudinally framed vessels, and at the end of June, 1912, sixty-four of these vessels, of 246,368 tons, had received the Society's classification. Since that date no fewer than 114 such vessels registering 593,400 tons, have been completed or are in course of construction, under the special survey of the Society's surveyors. The demand for new steamers intended for carrying oil in bulk, has enormously increased. Since the 1st July, 1911, sixteen vessels of 66,911 tons intended to be used for this purpose have been assigned the Society's classification, whilst there are now preparing and in course of construction at home and abroad no fewer than eighty-seven vessels, registering 479,000 tons, the plans for which have been approved by the committee. These figures represent practically the whole of such tonnage under construction, and it may be interesting to observe that ten of the vessels are 525 ft. in length, and of about 10,000 tons gross, these vessels being larger than any yet constructed for carrying oil in bulk. Concurrently with the increase in the number of vessels under construction for carrying oil in bulk, there is a great development taking place in the use of oil fuel instead of coal. The Society issued rules for the use of oil fuel as long ago as 1902, and within recent years, a few vessels have been adapted for burning such fuel. The more extended use of this fuel has been under the consideration of shipowners for some time, and several vessels when originally built have been constructed with oil fuel bunkers (although not supplied with oil burning apparatus), so that the conversion from coal to oil fuel can easily be effected in the event of its being considered desirable. Taking the United Kingdom alone, the following figures show the expansion which is now going on in the replacement of coal by oil. From the 1st January, 1910, to the present time, there has been completed, under the survey of the Society, fifteen oil-carrying vessels, and nineteen other vessels, constructed with oil fuel bunkers. Of these, four of the former type and fourteen of the latter were not fitted with oil-burning apparatus, whilst the remaining sixteen vessels had complete appliances. At the present date, oil fuel bunkers are being constructed in forty-five oil-carrying vessels and in nineteen other vessels, all of which are being built under the Society's survey. Complete oil-burning installations will be fitted in thirty-five of the former and in nine of the latter. The Society's rules for the burning and carrying of oil fuel are applicable to oil with a flash point not lower than 150°F., and in all the vessels hitherto classed under these rules, as well as in most of those now in course of construction in which oil fuel is to be used the arrangements are suitable for this class of oil. Recently, however, there has been a great development in the supply of oil fuel with a lower flash point, and it is intended that this kind of oil shall be used on board twelve of the large oil-carrying vessels now being built. In these cases, the bunkers and arrangements have received the special consideration of the Committee, who have approved plans providing for the special conditions which experience with the carriage of light oil has shown to be advisable. Should the use of low flash fuel oil for marine purposes become more general, the Committee will prepare detailed rules on the subject. The period under review has witnessed a notable extension of the Society's operations in the United States of America. There are forty vessels of 175,000 tons now in course of construction in that country for classification in Lloyd's Register Book. During the year, 1,060,111 tons of ship and boiler steel were tested by the Society's surveyors at home and abroad—an increase of 210,806 tons over the return for the year 1910-11. The great development in the oversea carriage of frozen and chilled meat, dairy produce, fruit, etc., shows no signs of abating, and again this year there is a large increase in the number of vessels in respect of which the Society's certificate of classification of refrigerating machinery has been issued. At the present time there are 161 vessels so classed in the Society's Register Book, and on these vessels 929 periodical inspections have been held at both the loading and home ports during the past twelve months. In addition, there are 22 vessels under construction, the refrigerating machinery of which is being built under the inspection of the Society's surveyors. The importance of these surveys, especially to shipowners and underwriters, will be appreciated when it is remembered that the 183 vessels mentioned above have insulated cargo chambers representing a total capacity of over 12,000,000 carcases of mutton. The annual circulation of Lloyd's Register Book continues to show a steady increase. 6,239 copies of the 1911-12 edition were issued. This number has already been exceeded in the circulation of the 1912-13 edition of the book, and the total number of this edition eventually issued will be the largest on record. The increasing extent to which wireless telegraphy and submarine signalling are being used in passenger steamers is shown by the fact that there are now recorded in the Society's Register Book 1,392 vessels fitted with wireless telegraphic installations, as compared with 1,013 at this date last year, and 630 fitted with submarine signalling apparatus, as compared with 566 last year. The number and gross tonnage of yachts classed in the Society's Register of Yachts are 676 yachts of 117,798 tons. Of these, 310 of 105,702 tons are steam yachts and 305 of 8,163 tons are sailing yachts, while sixty-one of 3,933 tons are fitted with internal combustion engines. To promote still further the study of marine engineering, the Committee have had much pleasure in granting "Lloyd's Register Scholarships" in that branch of study at Armstrong College, Newcastle-on-Tyne. These scholarships, like those previously established by the Committee in naval architecture, are of the value of £50 per annum tenable for three years. The Committee have now established fourteen scholarships, distributed as follows:—three in naval architecture at the University of Glasgow; three in naval architecture and three in marine engineering at Armstrong College, Newcastle-on-Tyne; three in naval architecture at the University of Liverpool, and two in marine engineering in connection with the Institute of Marine Engineers. The subject of the occurrence of fires in bunkers and in coal cargoes has been under consideration and an investigation has been made by Mr. Milton, the Society's chief engineer surveyor, with a view to ascertaining the practicability of taking steps to lessen their frequency, and the conclusions arrived at have been embodied in a printed report. A small Expert Committee has been appointed by the President of the Board of Trade to consider the question of the efficient subdivision of merchant ships in the interests of safety of life at sea, and Dr. Thearle has been authorized to act as a member of this Departmental Committee, which is now engaged upon its important investigations. The Technical Committee, at their meetings during the year, considered and approved alterations proposed in the Society's rules for the construction of ships and machinery.

LIFTS ON LINERS.—Messrs. R. Waygood & Co., Ltd., whose new factory in London was opened by the Mayor of Southwark on July 16th, as previously mentioned in this journal, have recently issued a little booklet containing illustrations of the various steamships of the big lines in which they have fitted passenger and goods lifts. From a perusal of the booklet it will be seen that the Company have installed their lifts on the largest and highest class of vessels. The quality of design and workmanship of the Company is well known and appreciated, as is evidenced by the repeat orders they obtain from all the great shipbuilders of Great Britain and other countries. Among the Companies using Messrs. Waygood's lifts are—White Star Line, Cunard Line, Royal Mail, Orient Steam Navigation Co., Hamburg-American Line, Norddeutscher Lloyd, etc. The Hamburg-America Co.'s *Imperator* will be fitted with three Waygood electric passenger lifts.

STABILITY OF SHIPS.

A PAPER on "Applied Stability of Ships" was read by Mr. J. H. Heck on October 21st, at the Institute of Marine Engineers, Stratford. Mr. J. T. Milton (chairman of council) presided.

In the course of his paper Mr. Heck said the art of making a ship stable really consisted in arranging and ensuring that the vertical line passing through the centre of buoyancy of any designed inclination, would intersect the middle line of the vessel in a point, the height of which above the top of the keel was greater than that of the common centre of gravity of the ship and all it contained. The information required to determine the statical stability was (*a*) the displacement, (*b*) the position of the centre of buoyancy line, and (*c*) the position of the centre of gravity. The two former could be obtained from particulars furnished by the drawings, and the values would remain the same during the life of the vessel. The real control of laden cargo steamers, however, was in the hands of the officers in charge, who for that reason needed, at times, some means of measuring the height of the centre of gravity, and the simplest and quickest way of arriving at this was by the operation of inclining. Side tanks in the double bottom could be used for this purpose at small expense, and as the moment produced by the tanks when full was known and constant, it would be possible

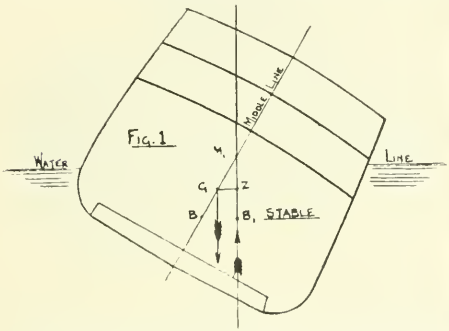


Fig. 1 shows the cross section of a vessel inclined at a considerable angle of heel. In the position shown, the vertical passing through the centre of buoyancy B, intersects the inclined middle line of the vessel in the point M, which is above G, the common centre of gravity of the vessel and all it contains. Under such conditions the weight of the vessel, acting vertically downward through G, and the pressure of the water acting vertically upward through B, form a couple tending to restore the vessel to the upright condition.

to supply simple instructions in the form of tables, so as to place in the hands of superintendents and masters an easy and practical method of gauging and testing the vessel's condition in regard to stowage and stability. Mr. Heck gave specimen tables for a vessel of 7,840 tons load displacement, showing the mean draught of water; the angle of heel produced on the vessel by filling the trimming tank, the metacentric height corresponding to the angle of heel produced, and the righting moment in foot tons (corresponding to the various angles of heel produced) for the respective angles of inclination of 15°, 30°, 45° and 60°. A note was also given at the foot of each table, stating the angle of heel which should not be exceeded.

In opening the discussion, Mr. Jas. Shanks said the method put forward by Mr. Heck was simple and would give reliable results if it could be carried out accurately, but he doubted whether this could be done sufficiently carefully under present-day conditions of loading. He asked if allowance had been made for loose water, of which no ship was absolutely free.

Mr. W. I. Steele was also of opinion that there would be little opportunity of taking inclinations while the ship was being loaded. Mr. J. Clark questioned the author as to the methods of arriving at the centre of gravity and metacentric height. He understood that a vessel with a high metacentric height was in some weathers almost as dangerous

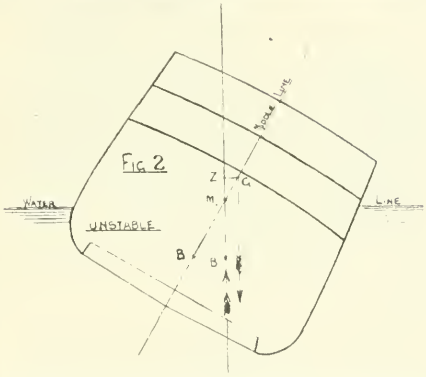


Fig. 2 shows the cross section of the same vessel inclined at the same angle and having the same displacement, but with the centre of gravity G at a greater height above the keel. In this figure the vertical through B, the centre of buoyancy, intersects the inclined middle line of the vessel in the same point M, which in this case is, however, below G, the common centre of gravity of the vessel and all it contains. Under this condition the weight of the vessel, acting vertically downward through G, and the pressure of water, acting vertically upward through B, form a couple tending to incline the vessel to a greater angle of heel, or still further away from the upright.

as a boat with a low one. He considered the idea of the trimming tank to be simple and one which would prove to be effective. Mr. A. Robertson referred to the difficulties of carrying out the suggestions when at foreign ports. He thought that in many instances the water in the boilers would effect a variation in the centre of gravity of the vessel which would produce an error in the calculations. He asked if the longitudinal metacentric height had any great effect upon the stability of ships at sea. Mr. F. M. Timpson was of opinion that it should be made as great an offence for a vessel to go to sea in an unstable condition as to go overloaded. Mr. Thomas referred to the high standard of the Board of Trade examinations for the extra chief engineers' certificates with regard to questions on stability. It would not be safe to say, even if a vessel had a negative metacentric height, that she was unsafe.

The Chairman pointed out that the tables not only gave the metacentric height, but showed also how the righting moments increased as the heel increased. He thought the

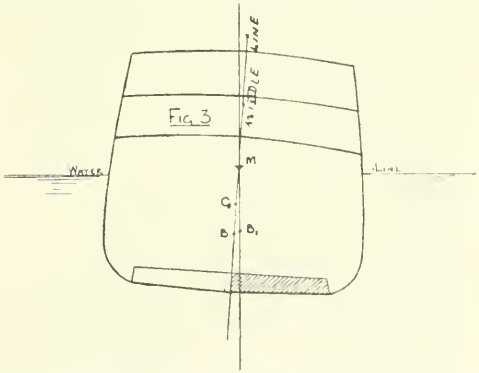


Fig. 3 shows the cross section of the ship inclined at a small angle of heel, say not exceeding about 6°. The vertical through B, the centre of buoyancy of the water displaced, intersects the inclined middle line of the vessel in the point M, a point which is practically known as the meta-centre, and for the vessel to be able to return to the upright, and remain in that position when floating in water at rest, the common centre of gravity G of the vessel and cargo must practically be below M, or, in other words, below the meta-centre.

questions of loose water and of using out the coal were calculable and could be allowed for. He suggested that a table might be prepared showing what the stability should be at a certain draught, when nearly loaded, as compared with that of the full draught when loaded. Mr. W. J. Dibb and Mr. John McLaren commented on the difficulties which might be experienced on putting the system into operation. In replying Mr. Heck said the paper was confined simply to cargo vessels, and not to the larger class of liners. The effect of free water could easily be determined. He said the inclination could be taken in about two hours, which would be amply compensated by the removal of many troubles due to instability." After describing graphically how his calculations were reached, he alluded to the importance attached to this subject to-day as compared with a few years ago, and expressed the view that such a method as he had outlined would be in general use before many years.

A hearty vote of thanks was accorded to Mr. Heck on the proposal of the Chairman.

ENGINEERING AND MACHINERY EXHIBITION.

THIS exhibition, open at Olympia, Addison Road, London, from October 4th to 26th, was well arranged and attractive, and all those who took the trouble to pay it a visit doubtless felt rewarded. The exhibits consisted for the greater part of machines and tools; these were to a large extent illustrative of the advances being made to meet the demand for labour-saving appliances, automatic adjustment of tools to suit the various classes of work, and special jobs. A great deal depends upon the machine and its capacity for dealing with the material it is expected to finish, ready for building into place, and amid the excellent machines on view it was clear that the manufacturers were fully alive to the present conditions ruling in the market. MESSRS. HARVEY & CO., whose plant for metal depositing is now being erected at Stratford, London, E., illustrated by means of several exhibits, the new process the firm has introduced and which was referred to in its initial stages some time ago. The process has great advantages over the older methods of galvanizing and depositing. Where so many well-known firms were represented by their equally well-known machines it is difficult in a few lines to refer even to a few:—The lathes of MESSRS. DRUMMOND, with the special tools for engine-room service; the machines of all kinds of MESSRS. PELS & CO., including punching and shearing machines, made to cut angle or tee bars, either square across or to a level up to 45°, and medium size machine shears through a $6'' \times 6'' \times \frac{5}{8}''$ angle bar in 4 seconds. Heavy bar shears of a type similar to those shown gained the "Grand Prix" at the Brussels Exhibition. The life-saving appliances associated with MESSRS. SIEBE, GORMAN & CO. included a demonstration with apparatus for use in spaces containing poisonous gases. MESSRS. ALLEY & MACLELLAN had a good show of stop valves and other fittings, with which the name of the firm has been associated for quality. The models and samples at the stand of THE BRITISH PETROLEUM CO. were interesting as a means of adding to the growing knowledge gained by marine engineers at these exhibitions. A superheater for locomotives by THE LOCOMOTIVE SUPERHEATER CORPORATION, Manchester, revived memories of discussions on the subject of superheating, the lubrication and quality of metal best suited for dry high-temperature steam, points which have now been fairly well resolved upon. A condenser tube ferrule recently placed upon the market was exhibited by the L. E. B. ENGINEERING CO. The ferrule is of flexible brass and adapts itself to the hole in the tube plate and the outside of the tube, thus sealing both from the circulating water. Other specialities of this firm is a piston ring for internal combustion engines, packings, rolling machinery and a universal grinder. There were several exhibits, by different firms, of typewriters with the various adaptations to lessen labour in connection with office work and save the time of the heads of departments; many of these were very ingenious and extremely useful. Samples of packings, valves and non-conducting materials were exhibited by MESSRS. WALKER & CO., LTD., THE DENINE CO., MESSRS. MATTHEW KEENAN & CO. and others. The recording instruments shown by THE CAMBRIDGE SCIENTIFIC INSTRUMENT CO. and THE FOSTER INSTRUMENT CO. were of very great interest and value, showing the advances made in the direction of scientific and accurate control of heat and the products of combustion with a view to obtaining the best possible results. The welding of metals by the gas process was demonstrated, as is usual at these exhibitions, by the various firms who have been instrumental in popularizing this method of repair. The machines exhibited by MESSRS. WALBER & CO., the representatives of MESSRS. CLIFTON & BAIRD, Johnstone, Scotland, called attention to the fine temper and set of teeth used in cutting bars of steel and iron whether of round, square, hexagon or other section. One machine exhibited cuts a 10-in. steel bar through in six minutes. There were so many exhibits, each and nearly all containing points of interest, that to give a description and indicate the lessons conveyed to marine engineering visitors would require too great an encroachment upon the space, which may be allotted in these pages. Many good and valuable lessons may be learnt at these exhibitions, and every encouragement should be given to sea-going marine engineers to visit one or other of them when in port to see the latest designs of machinery. There is no need for the ear racking steam winch being heard in the land, in view of the excellent work produced by the POWER PLANT CO. At their stand was exhibited a fine collection of spur and bevel wheels with double helical teeth, excellently finished and suited for light or heavy work, also several reduction and speed increasing gears. The recording gauges and instruments made by MESSRS. W. H. BAILEY & CO. claimed admiring attention for their appearance and finish. Other exhibits by this firm were a feed pump for high-pressure and patent belt-driven air compressor to run at a high speed, the patent valve gear being specially designed for great efficiency at a high number of revolutions. A large assortment of valves were also on view. Reference should be made to the stand of MESSRS. PERKIN AND CO., LEEDS, on account of the high speed tools, which are a speciality of the firm. The high-speed lathe shown at work gave every indication of steady cutting, and the hack saw is claimed to be the fastest and most accurate machine in the market for cutting bars. Other machines are made by MESSRS. PERKIN—lathes, drilling machines, grinders, etc. A rotary pump which will draw 8 ft. and discharge to a head of 60 ft., and a belt-driven pump for water, tar or liquor, of simple construction, are also specialities of their manufacture.

MESSRS. VICTOR H. COATES advise us that they have moved to more extensive premises at 121, Victoria Street, Westminster, since 26th October.

BOATS AND DAVITS COMMITTEE.—Mr. A. E. Doxford, of Sunderland, the engineer member of the Boats and Davits Committee, has been compelled, owing to private reasons, to resign his membership, and the President of the Board of Trade has appointed Mr. D. B. Morison, of Messrs. Richardsons, Westgarth & Co., Ltd., Hartlepool, to fill his place. Mr. Buxton has also added to the committee Captain J. T. W. Charles, C.B., R.D., Commander R.N.R., who has been in command of the *Lusitania* since the beginning of 1910. The Cunard Company have arranged to relieve Captain Charles from service until the committee is able to report.

INSTITUTION OF ENGINEERS AND SHIPBUILDERS IN SCOTLAND.—The syllabus for the fifty-sixth session of this institution has been issued by the secretary, Mr. Edward H. Parker. The session opens October 22nd by a meeting in the Rankine Hall of the Institution, Glasgow, when Mr. E. Hall-Brown will deliver his presidential address. The ordinary general meetings for reading and discussing papers will take place on Nov. 19th, Dec. 17th, 1912, Jan. 21st, 1913, Feb. 18th, March 18th, April 22nd. The following, with others, are amongst the papers to be read:—"Development in Auxiliary Units between Exhaust Pipe and Boiler," by Mr. William Weir; "Recent Developments in Wireless Telegraphy," by Mr. J. Erskine-Murray, D.Sc.; "Subdivision of Ships," by Mr. J. Bruhn, D.Sc.; "Boat-lowering Appliances," by Mr Axel Welin; "Oil-carrying Steamers," by Mr. J. Montgomerie, B.Sc.; "Injuries to Steel, subsequent to its manufacture," by Mr. Cecil H. Desch, D.Sc., Ph.D.; "Oil Fuel for Power Purposes," by Professor Thomas Gray, D.Sc., Ph.D., and Professor A. L. Mellanby, D.Sc.; and "Moulding Machinery for Foundry Purposes," by Mr. Thomas Macdonald.

MEIJER'S STEAM THROTTLE VALVE.

A NEW form of steam throttle valve is being put on the market by Messrs. Frederick A. Pullen & Co., of 25, Laurence Pountney Lane, Cannon Street, London, E.C. The main objects sought in the design are that it is simpler and cheaper in construction to manufacture, and costs less to fit compared with similar devices at present available. It is very efficient and easy to operate, it occupies smaller space and is of small weight, and, while being capable of remaining absolutely steam-tight, it affords a straight flow for the steam, thus obtaining high velocity without loss of pressure.

We illustrate in the adjoining illustrations, this new device, which is the invention of Mr. A. Meijer, Figure 1 being an outside view of the device and Figure 2 a view of the various parts disassociated from one another, while Figure 3 illustrates the general function of the apparatus.

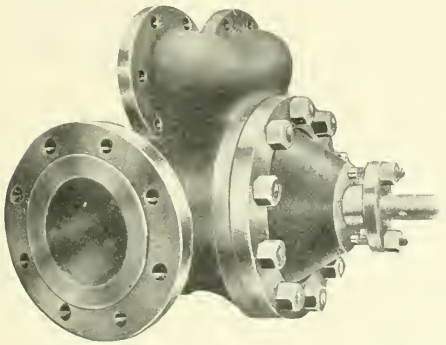


Fig 1.

It will be seen that the construction is very simple, consisting merely of a valve chest A, having either a solid or renewable valve face B, a rotating disc valve C, having radial ports J, so cast as to correspond with ports K in the valve face. Connected to the spindle E is a double-armed lever D, and the spindle

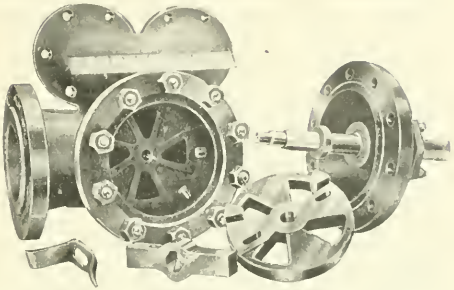


Fig. 2.

carries a spring F, so as to force the valve on to its face. When the double-armed lever D is moved so as to contact with the projection P^1 on the valve C, bye-pass ports H are uncovered, permitting a small quantity of steam to pass to the engine, at the same time producing a balancing effect upon the valve. Upon the continued movement of the lever D the valve C will itself be rotated through the projection P^1 so that the valve can be opened to a more or less extent, such extent being limited by the projection P^1 coming into contact with the bolt L projecting inwardly from the valve box wall, and in this position it will be seen that the valve is fully open. It may be pointed out that owing to the particular shape of the ports J and K, the steam passage will, at the commencement of the opening movement of the valve, be very small indeed, and it gradually increases with the continued rotation of the valve C, the edges of the ports in the valve and the valve face operating so as to form a pair of shears to cut any foreign substances that may accidentally come between the valve and its seat.

The balancing of the valve is effected by recessing its face between the ports J, which also effects a considerable reduction in area of the frictional surfaces.

The reaction of the spring F is taken on the valve box cover, and the valve can be easily operated by a lever direct on the valve spindle E, or by worm gear if preferred. It will also be noticed that the valve C is held tight on the valve face B by a certain amount of unbalanced steam pressure. In order to close the valve the projection P is provided, against which the lever contacts so as to rotate the valve about its axis and cover up the ports in the valve face. The angle of movement of the valve is about 60°.

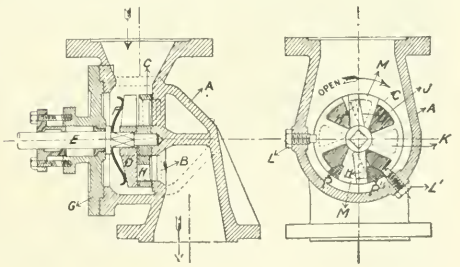


Fig. 3.

THE BRITISH ADMIRALTY BATTLESHIP FLOATING DOCK.—The final lifting trial of the "Dreadnought" dock, built by Messrs. Swan, Hunter & Wigham Richardson, Ltd., Wallsend-on-Tyne, for the British Admiralty, took place in the river Medway on the 2nd of October, when His Majesty's battleship-cruiser *Lion*, displacing 30,415 tons and drawing 31 ft. 6 in. of water, was successfully docked and lifted. The actual lifting operation of the dock from a draught of 31 ft. 6 in. until the pontoon deck was awash at the sides occupied three hours and ten minutes. The total distance through which the vessel was lifted was 36 feet, and the total quantity of water necessary to be pumped in order to raise the deck of the dock clear of the water was about 46,000 tons. After H.M.S. *Lion* had been cleaned and painted and some necessary repairs had been effected, the dock was lowered the following morning at 8 o'clock and the ship was undocked during the day. The operation of lifting this huge battleship-cruiser was one of the greatest interest, as no ship of a similar displacement has ever been lifted out of the water by a floating dock. The time occupied in lifting the vessel was well within the limits prescribed by contract. It is understood that the floating dock built at Birkenhead and stationed at Portsmouth, which is in all respects a replica of the Tyne-built dock, will be tested in a similar manner very shortly.

THE FLEETS OF THE MAIL LINES.

(From our Own Correspondent.)

Floating Docks.

THE new floating dock, which has been built on the Tyne for service at Lagos, has met with a misfortune similar to that which befell the larger structure of the same kind which was lost on the voyage to its station at Durban a few years ago. Breaking adrift off Finisterre from the two tugs which had been charged with the duty of taking her out to her destination, she eventually went ashore on rocks at Muros Bay. Her position from the first was bad, and when it was possible to inspect her it was found that the greater part of No. 1 pontoon was destroyed, that No. 2 was badly damaged, that though No. 3 was in good condition, that Nos. 4 and 5 were totally destroyed, and that No. 6 was leaking. Under these circumstances the conditions seemed hopeless enough and the underwriters must make up their minds to a loss of practically the whole of the £75,000 for which she was insured.

It is interesting, perhaps, to note that the policies under which her insurance was effected, stipulated that the voyage was to commence not later than the 1st September. But as this was found to be inconvenient it was agreed that the date was to be altered to not later than the 10th September, the rate of premium in consideration of this concession being advanced from 50s. per cent. to 55s. per cent. Eventually, bad weather coming on, it was arranged that the sailing should not take place till the 12th September. A final departure was made from Plymouth on the 19th September, and then such unfavourable conditions were encountered that on the 29th September the flotilla had not yet got as far south as the latitude of Lisbon. Then really terrific weather came on, the hawsers parted and the tow broke, and drifted north and east to the rocks.

An accident of quite another kind befell another floating dock which had just arrived in two sections at the beginning of October in the Elbe from its builders at Flensburg. The first part of this dock had come round a few weeks previously and it, too, had its little collision, but that of the second section was really serious. The Hamburg-American liner *Vandalia*, outward bound, ran into it and received such serious injuries that she sank in about 8½ fathoms off Krautsand, some 18 miles below Hamburg. The wreck of the steamer lay in the middle of the fairway, and the divers' reports indicated that there was no prospect of successful salvage, and it will be removed by the Nordische Bergungsverien. Strange to say, there was a second collision arising out of the first, the Hamburg-American Line's own steamship *Graecia*, also outward bound from Hamburg, running into the *Vandalia* shortly after her foundering. Two holds of the *Graecia* were found to be flooded, and she had to be beached, subsequently coming afloat and being put on the Vulcan Company's floating dock for repairs. The *Vandalia* was a vessel of upwards of 4,200 tons gross register, built at Glasgow in 1905 by Messrs. Charles Connell & Co.

A Local Inquiry

was held some time ago in Canada as to the loss of the steamship *Helvetia*, which sank in the river St. Lawrence after collision with the Canadian Pacific Railway's twin-screw liner *Empress of Britain*, and, in the early part of October, a circumstantial story appeared in many home newspapers to the effect that all questions between the owners of the two vessels had been settled by the payment of a sum of £60,000 by the Canadian Pacific Railway to the owners of the sunken steamer. How such a report can have originated does not appear clear. For the fact is that no compromise has been effected, the Railway Company denying all liability to pay anything, and the case is coming up for adjudication by the Judge of the Admiralty Court in London during the legal term which has just commenced.

The "Titanic."

A statement of the proposed scheme for the relief of those who lost husbands and parents by the foundering of this steamship has now been prepared. The total amount available seems to have amounted to some £425,000, and, in addition, there are the further sums paid by compulsion of law under the Workmen's Compensation Acts. What the bereaved claimants have received as this legal compensation is to be taken into account in computing what they are to receive from the voluntary fund. £140,000 is to be set aside for the relief of those who claim on account of the loss of passengers. There was a possible total of 802 persons under this head, but in point of fact only 513 claims have come in, though they represent 166 widows, 259 children and 410 other claims. Regarding the claimants from the point of nationality, it is found that 200 of these arise in respect of loss of persons of British nationality, whilst 313 are in respect of persons of foreign origin.

The bulk of the money, however, amounting to £300,000, is to be used for the purpose of dealing with the 654 cases arising from loss of members of the crew. It is to be distributed on the basis of the dead man's earnings—that word being so construed as to include, in the case of the stewards' department, tips. Thirteen widows, whose husbands earned £250 a year and over, will be awarded weekly allowances of £2; fifty-four others, whose husbands earned £175 to £250, will have £1 12s. 6d. a week each. The largest class, of 246 poor women, whose husbands were seamen, firemen and trimmers, at wages varying from £75 to £85 a year, will have 15s. a week, whilst those who had been dependant on the earnings of casual stewards will have 12s. 6d. a week. For children the rate is to be 3s. 6d., though in the case of large families that rate is reduced, 10s. 6d. being given where there are five children. Re-marriage will stop the allowance to widows, though they will be given a lump sum to enable them to start. Children's allowances will cease as and when they come of age.

Public Yachting,

at all events in passenger steamships of the older type, does not seem to be so attractive as formerly, for since last month, when we announced the sale of the P. & O. Company's s.s. *Vectis*, there has been another removal from the list. This is the iron screw steamship *Midnight Sun*, registered at Newcastle in the name of the Albion Steamship Co., Ltd. She was built as long ago as the year 1874 by Messrs. Caird and Co., of Greenock, and was originally a mail steamer of one of the German Companies. On leaving that employment she became a public yacht under the name of the *Midnight Sun*, but was taken away from that occupation and sent to South Africa during the continuance of the Boer War for use as a hospital ship. During this stage of her career she was known as the *Princess of Wales*. On her return to yachting she resumed the name under which she had formerly been known. In 1903 she had her engines tripled and was fitted with new boilers. It is believed that her new owners will break her up. Meanwhile co-operative yachting is by no means dead, but those who make a study of it find it more advantageous to employ modern twin-screw liners of the first class—P. & O., for example, announcing cruises in one of their big "M" steamers, the *Mantua*.

The Submarine Bell

seems to be progressing in favour with shipowners, though not as rapidly as its admitted advantages would seem to warrant. It is now announced that all the steamships of the Union Castle Line—with the exception of four vessels, one of which is under charter to strangers—are to be fitted with these appliances under the Gardner patents.

Recent Disasters

do not seem to have frightened steamship managers from the pursuit of luxury for their patrons. We notice in the descriptions of the 13,000-ton twin-screw mail steamship *Paul Lecat*, just added to the fleet of the Messageries Maritimes, that she has quite a novel attraction. It is a miniature theatre for the exhibition of Marionette shows! Ostensibly this innovation will be for the benefit of the children who travel in the saloon. But one may be quite sure that older people will not fail to take advantage of the exhibitions. But the *Paul Lecat* is an up-to-date passenger steamer all round—her accommodation is most luxurious and she is capable of a high speed—as Eastern mail speeds go, her maximum on trial being just under 18 knots.

The Difference in the Law

in the United States and in this country is well exemplified in the case of the proceedings which are now being initiated in the United States Courts for the purpose of limiting the liability of the owners of the steamship *Titanic* against

possible claims for loss of life and property. In this country the shipowner—in the absence of contract to the contrary—is liable for the damage brought about by the default of his servants, if proved, though by a special statutory provision the amount of that liability may be limited to a sum calculated at the rate of £8 a ton of her registered tonnage in respect of claims arising out of loss of property. Where loss of life is involved the limit is raised to £15 a ton. But if there has been default, and liability is properly established up to the statutory limit, the owner is liable, whether his ship be lost or not. In America it is otherwise. The owner can declare the value of his salvage—including such items as prepaid freight, and can obtain a decree from the Court that the successful claimants will be debarred from recovering anything more than their due proportion of this total. Thus, in the case of the *Titanic*, it is expected that the total amount recoverable—if liability be established—will not exceed a total of just under $92,000.

The P. and O. Fleet.

Just at the moment "K" seems to be the popular letter with the P. & O. Company. The improved "M," which has recently been ordered of Messrs. Caird & Co., is to be known as the *Kaiser I Hind*, and now it is announced that the four new 8,000-ton vessels, of which one pair is to be built at Caird's and the other pair by Messrs. Cammell, Laird and Co., are to be known as *Kashgar*, *Kashmir*, *Khiva* and *Khyber* respectively. There was a *Khiva* added to the fleet in the early seventies. She was built and registered at Sunderland by Messrs. James Laing & Sons, but she was not built for the Company. Under another name she had been launched for a foreign Company, but did not, we think, sail for those who ordered her. Then there was a *Kashgar*, also built at Sunderland in 1873 by Messrs. James Laing and Sons. A *Cashmere* has also been under the flag, but *Khyber* seems entirely new to the fleet.

Under the National Insurance Act

a curious notice has been issued in reference to the status of ships' officers. In a large Australian mail steamer the Commissioners have decided that the master, first, second and third officers, first, second, third and fourth engineers, purser, chief cook, chief steward, chief baker and barber are not employed by way of manual labour, and so are not necessarily insured under the act. The position of the fifth and sixth engineers, the chief electrician and the chief refrigerating engineer are under consideration. In the case of smaller steamships they have decided that certain of the engineers must be insured. This examination of the actual position of every individual before classifying him seems not only to give an immense amount of work to the Commissioners themselves, and their inspectors, but also to leave the matter in a difficult position which makes it almost impossible for each man to know his own status. It would surely have been possible to arrive at some more definite line of demarcation.

The New Zealand Shipping Company

has, it is reported, already disposed of the four vessels :—

Present name.	Late name.	Year built.	Place of build.	Builders.
Westmeath	*Everton Grange*	1903	Hartlepool	Messrs. W. Gray
Roscommon	*Oswestry Grange*	1902	Belfast	Messrs. Workman, Clark & Co.
Limerick	*Rippingham Grange*	1898	Belfast	Messrs. Workman, Clark & Co.
Tyrone	*Drayton Grange*	1901	Belfast	Messrs. Workman, Clark & Co.

which it purchased earlier in the year from the Houlder Line. The fact that, though they re-named them when they took them over, they did not give them native New Zealand names, in accordance with their usual practice in regard to the vessels of the fleet, rather led one to the idea that they did not mean to retain them for long.

A Curious Accident

and one that brings back memories of the sinking of the *Austral* in Sydney Harbour, many years ago, and of the *Orotava* in Tilbury Dock somewhat more recently, has occurred to the important Japanese steamship *Umegawa Maru*, of Tokio. This vessel, though of little more than 3,000 tons gross register, was an expensive and valuable ship, being built for the mail and passenger service of the Imperial Marine Association, and being fitted with turbine engines. She was anchored in the port of Moji and was having her engines and boilers cleaned when she was struck by a typhoon which did a good deal of other damage. Owing, it is said, to the cover of a ballast tank having been left unfastened, she listed over, filled and sank. Though she lies only in seven fathoms of water it is said that salvage is out of the question, owing to the fact that she lies over on her port beam ends, and is exposed to the full force of strong currents, which make it impossible for divers to work except for short periods in each tide.

A Fine Piece of Salvage Work

took place in the floating of the steamship *Star of New Zealand*, of 4,417 tons gross register, which was beached in Holyhead harbour after collision with a London and North-Western Railway Company's steamship. In running for the shore she struck a sunken rock and sustained serious bottom damage in addition to that caused by the collision. The position was a difficult one, as the bottom consisted of from six to ten feet of mud with huge boulders beneath. The mud prevented the divers from dealing with the fractures in the bottom. The salvage officer, however, managed, by working the *Ranger's* 12-inch pump for fourteen hours in the vicinity of the wounds, to scour the mud away, and thus enable the openings to be covered up. The accident occurred on the morning of Saturday, 21st September, and on the 27th the vessel was floated. She left Holyhead on the 29th, and docked in Liverpool on the 30th September. By this prompt action she was rescued from a position of great danger, as the spot where she lay was much exposed, and had heavy weather come on she might have easily sustained further damage if she did not actually go to pieces.

A Coasting Craft Amalgamation.

Two well-known Liverpool firms of coasting traders have joined forces, the Powell Line having absorbed Messrs. John Bacon's fleet. The Powell Line owns about ten steamships, of which the largest are the *Masterful*, of 1,749 tons, built in 1905, the *Powerful*, built two years earlier, of about 1,600 tons, and the *Graceful*, built last year, of 1,149 tons. The Coast vessels—*Cornish Coast*, *Devon Coast*, and such like—are also of this Company, whose trade is round our southern and western coasts. The Bacon Line trades between Liverpool and Swansea, Wexford and Bristol. Their steamships are of somewhat smaller tonnage than those of the Powell Line, the biggest being the *Prestonian*, of 804 tons, built in 1899. Several of these vessels are quite new—the *John Bacon* having been built in 1910, whilst the *Lord Bacon*, *Lady Bacon* and *Hartat* came from the stocks in the course of last year.

The German Government

never fails to show its desire to facilitate the operations of its great steamship companies. The last instance of its desire to help them is seen in the fact that high officials of the German customs and other departments met a great passenger steamship of the Hamburg-American Line at Cherbourg on a recent eastward voyage and travelled back to Hamburg in her, with a view to seeing how far it would be possible to arrange for the Customs examinations of passengers' baggage to be made before the vessel arrives at her home port. It is said that they came to the conclusion that it would not be difficult to carry the idea into effect. How different is the action of the New York authorities! Stories of outrage upon passengers, both of foreign and of United States nationality are constantly exposed in the press. But they have no effect in softening the rigour of the treatment, and now it is reported that one of the Goulds—the great millionaire family of the American railway world—is about to take action in the Courts, owing to the treatment meted out to him and his wife on their arrival at New York from a European visit.

MESSRS. J. STONE & CO., LTD., have received instructions to supply a number of their new patent "Hydraulic Underlime Ash Expellers" for the super-"Dreadnought" battleships now under construction, *viz.* :—*Iron Duke*, *Marlborough*, *Delhi* and *Benbow*.

FOREIGN NOTES.

France.

The small German steamer *Blankenese*, of the Hamburg-America Line of 462 tons, has just been sold to a French Company at Boulogne, where it is to do service as a tender to bring passengers on board the large liners, such as the *Imperator*; it is, in fact, only a change of flags, virtually stationing a German steamer in a French port.

The Compagnie Générale Transatlantique has at present six large steam vessels in course of construction at its shipyard, namely:—*Mississipi* length 159 metres, of 12,900 tons and of 3,500 h.p.; *Flandre*, length 149·5 metres, of 11,330 tons displacement and of 10,000 h.p.; *Haiti*, length 130·5 metres, of 6,600 tons displacement and 4,500 h.p.; *Intrépide* length 100·5 metres, of 2,600 tons displacement and 1,600 h.p., in addition to these, the *Georgie* and the *Porto Rico* are to be built but their dimensions are not yet definitely decided. All these steamers will be engaged in service between French and North Atlantic ports. The steamer *Vectis* has been purchased by a French Company from the Peninsular and Oriental Company. She is to be stationed at Morocco and to serve as a hospital ship for the French Government.

The Chantiers de Normandie have just received an order for a petroleum steamer to be constructed on the Isherwood system, and to be driven by two Diesel motors. The same shipyard has also received orders for two steamers of 10,000 tons for a shipping firm at Hamburg, the first order of this kind placed in France by a German firm. The *Doukala* has just been purchased by the Compagnie Paquet, and is destined for service between Marseilles and Morocco. This steamer, formerly the *König Wilhelm*, is a very splendid vessel, and was built at Rotterdam in the year 1900. She is of 4,700 tons displacement, and has 4,000 h.p. She will undergo some necessary arrangements for improved passenger accommodation, and will enter on her duties as soon as possible.

The New Compagnie of Bordeaux is on the point of sending off the *Burdigala*, of 12,480 tons, on its first voyage to Brazil and La Plata. This steamer is the original *Kaiser Fredrich*, built at Elbing in 1897 for service as a mail and passenger steamer.

The Compagnie Sud Atlantique have placed orders for two mail steamers; the first, which will be named *Gallia*, has been placed with the Chantiers de la Méditerranée, and the second, to be named *Lutetia*, with the Chantiers de l'Atlantique. They are to be of 15,500 tons each, and to have a speed of 20½ knots. They will be fitted with accommodation for 260 passengers of first class, 100 of second class, and for 500 steerage passengers. Their engines will develop 20 000 h.p., and the journey to Buenos Aires is to be accomplished in quick time.

Germany.

At the shipyard of Tecklenborg, Ltd., at Bremerhaven, Geestemunde, the new steamer *Sturmfels*, for the Hansa Company, has just been successfully launched. Length 134 metres, beam 17 metres, carrying capacity 9,000 tons. The steamer *Sturmfels* has been built to the highest class of the Lloyd's classification, and she will be propelled by a quadruple-expansion engine developing 3,000 i.h.p., giving her a speed of 11 knots. The same shipyard has a further steamer of 9,000 tons to the order of the Hansa Company.

The passenger and cargo steamer *Professor Woermann* has gone through her trial runs very successfully. Her length is 119·4 metres, beam 15·8 metres, and she is of 6,200 tons carrying capacity. The hull is divided into seven watertight compartments, and she is supplied with boat space for every one on board. She is fitted with a quadruple-expansion engine of 3,860 i.h.p., giving the ship a speed of 13½ knots. There is accommodation for 120 first-class passengers, ninety-four second-class passengers, and for fifty third-class passengers. The first-class saloons have transparent marble panelling through which a mild agreeable light is distributed throughout the saloons. Provision is made for every comfort for the passengers, including a medical consulting room, a hairdressing saloon, a sick-room, a tailoring shop, laundry, etc. The kitchen, pantry, refrigerating plant are also fitted out in the most modern style. The vessel has a wireless installation.

The *Weser* shipyard has received an order from the Roland Line for a cargo steamer of 11,000 tons, to be completed as speedily as possible. An order has been placed by the German Australian Steamship Company with the Tecklenborg Shipyard at Bremerhaven, Geestemunde, for a cargo steamer of 9,600 tons, to be fitted with engines developing 3,800 i.h.p. The Hansa Steamship Company has placed an order for three cargo steamers of 9,000 tons with the "Weser" Shipyard at Bremen. The Hamburg-America Line has placed orders for two large cargo steamers with the "Weser" Shipyard at Bremen, and also two further cargo steamers with the Flensburg Shipbuilding Company. They are to be employed in the Atlantic service, and are to be completed as soon as possible.

The North German Lloyd has placed orders with the Vulcan Works at Vegesack for four cargo steamers, each of 11,000 tons. These new steamers are to be fitted up with all the latest appliances for dealing with cargo in an expeditious manner. Cabins and saloons will be equipped with electric light, and also be comfortably fitted up to meet modern requirements.

The South American Steamship Company has placed an order with the Blohm and Voss Shipyard for a large passenger steamer with three propellers.

Italy.

At the Monfalcone Shipyard there are at present six cargo steamers in course of construction, of which three are of 11,000 tons, to the order of the Austro-Americana, and three to the order of the Navigazione Libera. At San Rocco, near Trieste, the large Lloyd steamer *Marienbad*, of 15,000 tons, and the twin-screw steamer *Baron Bruck*, of 2,400 tons, are on the stocks. The first is destined for the Indian and the latter for the Dalmatian mail service. At the San Marco Shipyard a cargo steamer of 6,900 tons, to the order of Messrs. Gerolimich & Co., is in course of construction.

The new shipbuilding programme of the Government is not to include any battleships, but only armoured cruisers of 6,500 to 7,000 tons displacement. There are also to be built two armoured cruisers of 2,600 tons for duty in the Red Sea and the Indian Ocean.

The steamer *Kaiser*, of the German East Africa Line, at Hamburg, built in the year 1890, of 1,800 nett register tons, has been purchased by a shipping firm at Genoa.

Denmark.

A Copenhagen boat builder has at present forty-three life-boats for the *Imperator* in the course of construction. These boats are being built according to Engelhardt's patent.

Brazil.

The two battleships *Deodoro* and *Florian*, which were built in the year 1898 in France, are now undergoing a thorough repair at Rio de Janeiro. The old boilers are being taken out and are being replaced by Messrs. Babcock and Wilcox boilers.

Japan.

The Budget of 1913 is to contain thirteen large units, of which two are to be laid down in each year. Seven are to be super-"Dreadnoughts" of the largest type, mounted with 14-inch guns, and six will be powerful cruisers. Of these "Dreadnoughts," five are to be built in the Government Dockyards of Kure and Yokosuka, whereas the other two are to be placed with foreign shipbuilders. The construction of the cruisers is to be effected in the private and Government shipyards of Japan.

Leith.—Negotiations are pending for the purchase of a vessel being built here for the Scottish Motor Coasting Co. by Messrs. Cran. The firm whose agents are negotiating are in the market for a motor cargo boat of approximately the size of the one in course of construction. The dock extension, which has been under contemplation for some time, has now been resolved upon, subject to the usual legal steps on the part of the dock authority. The proposed extension involves reclaiming from the estuary of the Forth a large tract which will be embanked between Leith and Newhaven, consisting of approximately about 120 acres in extent, and providing accommodation for shipping and the various industrial works associated with the shipping trade of the port. The progress of work at Rosyth on the other side of the Forth has been impeded during the month by a strike of the navvies.

THE RAMSAY ANTICIPATING MARINE GOVERNOR.

A NEW form of Marine Governor is being put on the market by Ramsay's Marine Engineering Co., Ltd., of Deptford, London, S.E. The governing of a marine engine is a subject which has interested generations of engineers. It has afforded hundreds of inventors a problem of great difficulty to solve, and the world, as a result, is presented with a large number of devices designed to effect the purpose, but with very varying success.

It is not certain whether shipowners—who are really more interested in this question than other people—quite fully appreciate the importance of a really efficient governor for marine engines. The result of racing is strained engines, broken shafts and loose seats. The flaw in a shaft is no doubt often started by some abnormal strain, and its extension is

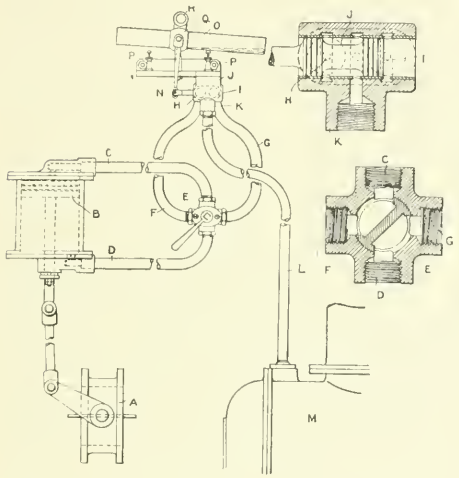


Diagram illustrating the Ramsay Anticipating Marine Governor.

only a question of a certain number of impulses before final fracture takes place; for example, a flaw may be started in heavy weather, while the shaft finally fractures months afterwards during ordinary conditions; hence, to prevent abnormal strains in the machinery, effective governing is of immense value to the shipowner, as apart from the expense of installing a new shaft, the loss of earning capacity by the ship lying up is a serious item. Again, when on a voyage, if the governing of the engines can be absolutely and automatically controlled in a reliable manner within safe limits, much better speed can be maintained, and the saving in coal and time thus effected, carries with it the corresponding saving in cost of running the ship, including the feeding of the whole Ship's Company. Then above the commercial considerations there is the predominant one of safety of passengers and crew, and it will be recognised that an efficient governor is an important factor in this matter.

Many attempts have been made in the past to devise a marine engine governor which, while being effective in governing capacity under all conditions of working, shall at the same time be absolutely certain of action, but success has not hitherto crowned those efforts. If a governor is to engender confidence in those responsible for the working of the engines and the safety of the ship so far as its propulsive functions are concerned, it must have the merit of being capable of working without the least risk of derangement from causes likely to arise under ordinary working conditions.

It is claimed that the Ramsay Governor complies with those conditions to the full, and after a study of the operation of working, this fact will be admitted by all those competent to judge by the light of actual practical experience.

The governor is a device designed to prevent racing of the engines. The position of the engineer on board a ship is one of great anxiety and mental strain in rough weather, owing to the unremitting attention that he has to devote to the throttle. This anxiety is very much increased when the ship is in ballast. It is claimed that this governor will automatically control the throttle in any weather without attention, and the engineer is freed from any responsibility or trouble on that score. Unlike any other governor, the Ramsay Governor is anticipatory in nature, that is to say it operates before racing can take place, and this anticipating movement of the governor can be adjusted in a few seconds to any degree of delicacy that may be considered necessary to suit the trim of the ship. Racing of the propellers is impossible because as soon as they get dangerously near the surface the inclination of the ship which causes this, also causes the governor to automatically close the throttle, and as soon as the inclination of the ship ceases to be dangerous, the governor again automatically and immediately opens the throttle. As stated before, the governor can be adjusted in a second by a turn of a screw so as to operate at any desired predetermined angle of inclination.

As will be seen from the adjoining illustration the whole of the mechanism of the governor is simple and free from complications, and all the working parts are of such a nature as to practically preclude the possibility of their getting out of order.

The piston in this governor is actuated by vacuum in closing and opening the valve automatically as the trim line of the ship varies and there is no shock.

The instalment of the governor is also exceedingly easy and simple and unlike others which sometimes take days, the whole work of fitting one on board, once the principal dimensions are taken, can be carried out ready for working within the course of a tide. The great importance of this point will be appreciated by those who know the time lost and complications involved in fitting other governors on board.

It is stated that engineers using these governors find that they are able to run under full head of steam in the most severe weather, instead of having to reduce pressure as formerly, thus enabling them to catch tides and reach port up to time, while the vessel makes better way and answers her helm with greater promptitude.

The diagram illustrates not only the general arrangement of the various parts comprising the apparatus,

but also the internal construction of certain parts to assist in the description of the operation.

The throttle valve A of the engine is operated by an atmospheric power cylinder and piston B. The ends of the cylinder are connected by pipes C and D with a 4-way cock E, the other branches of the cock communicating by pipes F and G with the end ports H and I of the atmospheric piston valve J. The valve casing has a third branch K connected by a pipe L with the condenser M. The piston valve J is operated by an arm N carried by a tiltable tube O containing a certain amount of mercury. This tube is placed fore and aft in the engine room, its angular movement is limited by adjustable stops PP, and its position in the split cradle Q can be varied by first loosening the jamming screw R, so as to admit of the tube being slid more or less out of centre to vary the leverage of the mercury on the valve J and to adjust the apparatus for head or stern seas as the case may be. For example, the head of the ship is supposed on the diagram to be on the left and the stern on the right, the tube O being set for head seas. When the ship has passed through a wave and the head is gradually inclined downwards thus bringing the propellor near the surface of the water, the mercury runs towards the left-hand end of the tube and rocks the tube O operating the valve J, putting the port H into communication with the atmosphere and the port I with the condenser. The piston B is now forced down by the atmosphere owing to the vacuum underneath, and the throttle A is closed.

When the ship is returning to the horizontal position again, the mercury flows back, and in time overtilts the tube O into the original position, opening the port I to the atmosphere, and port H to the condenser, when the throttle A is again opened. For stern seas the tube O is slid along in its cradle to the left so that the mercury normally weighs down the left-hand end, and the cock E is reversed in position so that the connections with the atmosphere and the condenser relatively to the two ends of the cylinder are reversed, and the necessary action under the changed conditions compared with those previously described can take place. The adjustment of the stops P P is made to comply with the conditions obtaining with light or heavy loading of the ship, for example, the angle of movement of the tube is smaller for a light ship than for a heavy ship.

It will be seen that the passages of the apparatus are large in cross-section, and therefore cannot become blocked with foreign matter. The actuating medium being the atmosphere, the system is a low-pressure one, and leaks have no serious detrimental effect on the operation; further, troubles from oil, scum, dirt and other foreign bodies associated with a steam service as an operating medium are entirely avoided. The simplicity of construction renders the attention necessary to be of a minimum amount, while the examination and cleaning of parts can be most expeditiously effected.

MARINE MOTOR NOTES.

THE Beardmore 15 B.H.P. crude oil engine, illustrated in last issue, including the reverse gear, occupies a space of 6 ft. long by 2 ft. 6 in. broad by about 4 ft. high. These figures are given in reply to an enquiry on the subject. The motor vessel *Fordonian* left the Clyde on her voyage to Canada early in October; but, unfortunately, owing to trouble with the auxiliary machinery for the air-compressor, she had to return for repairs, before continuing the voyage to her destination. At the Engineering Exhibition held at Olympia in October, the Tuxham Semi-Diesel crude oil engine was on view and at work from time to time; it seems to be well adapted for small boats, barges and coasters, simple in construction and with few working parts. A gold medal was awarded to the makers of this type of engine at the Copenhagen Exhibition; to Price's Candle Co., who recently took over Messrs. Chas. Price & Co., with the designation Messrs. Price's Oil Co.; an award was also given for their special oils, to the manufacture and mixing of which close attention is paid to obtain the best results, whether for fuel or lubrication. A new speciality of service and value in the cause of lubrication was shown at Olympia, along with the high and low-tension magneto sparking apparatus manufactured by the Bosch Magneto Co. The Canadian Lake vessel *Calgary* has been reported from Quebec as having arrived. She is fitted with twin oil engines of about 600 H.P. The Scottish Motor Ship Co. has had another vessel 68 ft. long launched at Kirkintilloch by Messrs. McGregor, now being fitted with the Bolinders engine. In the course of another year, the large specially-designed works at present under construction at Ipswich, and the existing engine-works at Glasgow, Newcastle and Belfast, now being adapted for the building of oil engines, will probably be fully employed, as the leading Continental firms have as much work in hand as can be undertaken within the next year or two. The *Monte Penedo*, described last month, will probably be followed by another vessel of similar type. The application of oil or gas to a rotary engine has occupied, and still occupies, the attention of engineers. The Augustine rotary engine, referred to elsewhere, is stated to be as suitable for gasoline or alcohol as it is for steam.

It is noted with regret that the *Inniskea* (Scottish Motor Ship Co.) has been wrecked on the west coast of Scotland, due to circumstances of weather and breakages of mooring ropes. She was one of the vessels of the class fitted with the Bolinders engines. There is a rumour, not yet authenticated, that one large steamship company is contemplating the building of a vessel to be driven by oil engines, the rumour will probably be confirmed shortly. Besides this there are other companies carefully considering the question of steam or oil engines for vessels in contemplation. The increased cost of labour in connection with the stokehold and the other elements which conspire to add to the difficulties of steamship working render the consideration of a change from steam to the newer motive power, one with a balance towards favouring the latter. Messrs. Swan, Hunter & Wigham Richardson have favoured the oil engine combined with the electric transmission and speed reduction in order to obtain propeller efficiency, and although this has been due to the special conditions of service traffic, it would appear that the arrangement should give good results generally, *i.e.*, a high speed motor and a low-speed propeller. The movements of the *Toiler, Jutlandia, Sembilan, Selandia*, are duly noted in the shipping lists from time to time, and are carefully watched that their progress may be taken as indicative of results. The investigations in the direction of obtaining oil from coal for oil engines appear to be favourable towards this end and if successful would tend to improve present conditions.

An oil motor vessel for a Portland Cement Works Company on the north-east coast has been ordered, and there are in course of construction a number of auxiliary motor vessels for fishery and pilot services. The 8,000-ton oil-tank vessel, about 460 ft. long, to be built by Messrs. Vickers for the Admiralty, is to be fitted with twin Diesel four-cylinder engines of about 2,500 h.p. Another vessel for the S.M.S. Company, named the *Innismurray*, launched at Alloa on the Forth, and fitted with Beardmore engines, has run successful trials, and will take up her station in the coasting trade. The *Eavestone* appears to be making good records in her voyaging to and fro, probably paving the way for further developments on the part of the Company. *Christian X.*, renamed from *Fiona*, is making progress from port to port, and her builders, Messrs. Burmeister & Wain, have nine or ten large vessels of similar tonnage on order. The 100 h.p. suction gas engine exhibited by Messrs. Kynocks, Ltd., at Olympia, it may be noted, worked very quietly and was an attractive study to many engineers, as was also the oil engine at the stand of the Westinghouse Company.

LETTERS TO THE EDITOR.

To the Editor of THE MARINE ENGINEER & NAVAL ARCHITECT.

EXPERIMENTAL TANK.

Sir,—In your October issue, Colonel de Villamil gives his reason for the different force exerted on a plane surface towed through water and on a plane surface with water flowing past at the same velocity as the difference being due to the slope of the water.

I venture to suggest that this is not the case, as the surface of the water is practically level, but that it is due to inertia of the water that has its direction of flow changed by the plane surface. The inertia is greater in the case of a moving body than in the case of one stationary.—Yours faithfully,

G. R. HOWES.

Bushy Park, Bristol, October 10th, 1912.

To the Editor of THE MARINE ENGINEER & NAVAL ARCHITECT.

Sir,—In your remarks on my letter (October issue), I think you have misunderstood my point—possibly I explained it badly. To eliminate all *differential* boundary effects it is clearly necessary that the vessels containing the water should be of the same dimensions, in all the cases—(1) when the water is at rest and the body is moving, (2) when the containing vessel is being moved past the body at rest, or (3) when the liquid *flows* past the body at rest; in this latter case the breadth and depth of the stream are alone referred to.

You, very naturally, ask "Why should gravity have more effect on the boat than on the water of equal weight which would occupy the cavity vacated were the boat removed?" If the question be qualified by the assumption that the water were solidified, or enclosed in a weightless envelope, then we are in agreement. The water would also move faster than the stream; the two cases are not, however, exactly similar.

To prevent any misunderstanding it is necessary to define what is the "velocity of the stream."

An irrigation engineer would say it was the arithmetical mean between the velocity of the water at the bottom of the canal and that at the surface of the liquid. This would be correct from his point of view; but it is, presumably, not yours, which, I suppose, would be that, from a resistance point of view, the "velocity of the stream" should be the mean between the velocity of the water at the depth o the *bottom of the boat* and at the surface of the stream. Le us accept this definition. It is also notorious that the velocit of different filaments of the water decreases, arithmetically v as the depth; or in algebraical shorthand,

$$V = V_s - a\,D,$$

where V_s = surface velocity.

D = depth and a is a small constant. This is true in small channels and Ravey ("Hydraulics of Great Rivers") showed it was equally true—down to some considerable depth—in such rivers as the Amazon and the Parana. The resistance is generally assumed to vary as the *square of the velocity.*

If we assume the flowing stream to be divided into three layers whose velocities are as 3, 2 and 1, the resistance at the different layers would add up to

$$A\,(3^2 + 2^2 + 1^2) = 14\,A$$

whilst, if calculated by the "velocity" of the stream (as defined) the sum would be only

$$A\,(2^2 \times 3) = 12\,A.$$

The former would be 16 per cent. greater than the latter. If, however, we imagine our stream divided into 10,001 layers, then the sum of the resistances would be as 333 : 250; or the increase would be about 33 per cent.

If the body moves in water at rest the "velocity" is the same at all depths; and the stream may be imagined as divided into any number of layers without altering the calculation of resistance. Similarly when the vessel containing the water moves past the plate, all parts of the liquid move at the same velocity; and *these two cases* are *strictly reversible.*

I trust now that my point is clear. To borrow a convenient expression from Professor Zahm: in the one case the liquid is a *static** one, whilst in the other *it is not.* The flowing water (assuming the flow to be steady) is not changing its velocity, but it is *changing its shape.*

M. Eiffel has latterly made some very excellent experiments with air in motion, special precautions being taken for causing the velocity of the air to be the same at all parts of the stream. He then measured the pressure on the parts of a plate exposed to this stream and plotted the *contours of pressure.* The Duc de Guiche reversed the experiment, moving the plate (by means of a motor-car) in still air. He also plotted the contours of pressure. These "topographical diagrams" bear but a very distant resemblance to one another.

Even as regards "total pressure," Eiffel† found a very marked *maximum* in the region of 37° (angle the current of air makes with the surface of the plate—"angle of attack"); whilst the Duc de Guiche could not find this *maximum* at all; he only found a *very light maximum* at about 60°.

To return to Dubuat and the boat floating down the stream. Of course, he may have made some errors in his measurements of velocities; and it is the easiest thing to *assume* that he did. Experiments don't agree with accepted theory—*they must be wrong.* The awkward point to get round, however, is that in Vol. I. ("Principes d'Hydraulique") he argues the question theoretically and comes to the conclusion that the boat *must* travel faster than the stream; in Vol. II. he states that he tried the experiment and found that the velocity was in excess of the *greatest surface velocity of the stream!* His reasoning does not appear to me to be at all absurd—more especially as he says that this fact has been "long known to boatmen accustomed to navigating rivers." Certainly, if there is no relative motion between the boat and the water it is floating in, I find it difficult to understand what there is to *prevent the boat sliding down hill* on the water. If we imagine the boat, or other floating body, so diminished as to be approaching the size of molecules of water, then the relative motion would no longer exist.

A necessary corollary to this is, that if a river is carrying logs of wood or blocks of ice, it will flow faster than if free from them. This I have reason to believe is a fact.—Yours faithfully,

R. de VILLAMIL,
Lt.-Col. R.E. (Ret.).

Carlisle Lodge, Rickmansworth, Oct. 11th, 1912.

LUTHER DIMO-GRIT GRINDERS.—The grinding of tools has occupied a good deal of attention for some years past with a view to facilitate work and save the machine attendant's time. Most of the large works have a department specially allotted to what is really an art and craft, that of grinding tools to suit the various machines and the different classes of work and material. In the smaller workshop the expert grinder may be employed in a dual capacity and with advantage his services as an expert are recognised. The old-fashioned grindstone has given place to mechanism and grinding material, which have been improved year by year, and the catalogue issued by Messrs. Ferguson & Timpson, 104, Minories, shows that both the mechanism and the material have been brought up to a high state of perfection and simplicity. Dimo-grit is composed of hard crystals obtained from a special process. Although hard it is tough and does not injure the tool or its temper in the process of grinding. The grinding wheels are mounted on stands to suit all classes of tools to be sharpened or work to be polished. There are special sets for small workshops and for ship work, adapted for hand, foot or motor drive. The manufacturers have made the perfecting of their grinding machines a close study for many years.

* By static fluid is meant one that is not changing shape or velocity.

† I mention Eiffel, but Dines (working on the same lines) found the same *maximum*, though in a less degree; latterly, also, Eiffel's results have been confirmed at Gottingen—experiments being conducted on air moving in a tunnel.

Industrial and Trade Notes.

THE CLYDE AND SCOTLAND.

(From our Own Correspondent.)

New Naval Work.—Messrs. Wm. Beardmore & Co., Dalmuir, are to build three of the eight fast armoured cruisers of this year's Navy programme, while of the other three put out to contract, two are to be constructed by Messrs. Vickers, Barrow in Furness, and one by the Fairfield Shipbuilding and Engineering Co., Govan. The remaining two vessels are to be built at Chatham and Pembroke respectively. The cruisers are, according to the First Lord, to be smaller than the protected cruisers now in hand, but faster. It is understood that five of them are to have Parsons turbines and three Brown-Curtis turbines. The Parsons ships will be Messrs. Beardmore's three, and Messrs. Vickers two. Fairfield's ship is to have Brown-Curtis turbines and so are the two ships which are to be built, one each at Chatham and Pembroke. The contractors for the machinery of the dockyard ships are the Thames Ironworks Co.

At present there is a considerable amount of naval ship building on the Clyde, and it is understood that estimates are being prepared for a super-Dreadnought and for machinery for battleships to be built in the naval dockyards. These orders are expected to be placed towards the end of the year. Messrs. Beardmore, it may be added, despatched on 10th October a 9·2-in. gun, the first completed entirely within the firm's works at Parkhead. They recently erected a new workshop equipped with machinery for manufacturing breech mechanism, the only part of the gun which they were hitherto unable to make within their own premises.

Messrs. John Brown & Co., Clydebank, have been employed during the greater part of October carrying out speed and other trials with H.M.S. *Southampton*, a cruiser 450 ft. in length, and with 5,400 tons displacement. These included a thirty hours' continuous test. Fitted with the Brown-Curtis turbines, and with machinery of 25,000 s.h.p., she is designed to attain a speed of 25·5 knots. Her armament consists of eight 6-in. guns.

In the domain of mercantile shipbuilding, activity in launching has proceeded during October with the same regularity and pace as were recorded regarding September. The bulk of the work, however, was of the conventional order except in the case of two vessels, which are here undermentioned. With the beginning of October new tonnage sent afloat recently was augmented by the steamer *Infanta Isabel de Borbon*, a combination triple-screw steamer, which Messrs. William Denny & Brothers and the associated engineering firm of Messrs. Denny & Co., Dumbarton, have designed and will complete for the Compania Transatlantica of Barcelona. A full description of this vessel is given in the "Launches and Trial Trips" Section of this journal. The second vessel referred to as of extra interest is the geared turbine steamer *Curzon*, which Messrs. A. & J. Inglis, of Pointhouse, launched on October 12th, to the order of the South Indian Railway Co. for service between the systems ending with the southern end of India and beginning at Manaar on the northern end of Ceylon. A fuller description of the vessel (one of three which Messrs. Inglis have on hand) and of the nature of the service is given elsewhere in this issue.

Messrs. A. Stephen & Sons, of Pointhouse and Govan Dock Repair Works, early in October put the finishing touches to the Aberdeen White Star liner *Marathon*, which they have cut asunder and lengthened by about 50 ft. amidship. On October 11th she left the Clyde almost absolutely a different ship than when she arrived at Glasgow about the beginning of July. Not only was she lengthened by about 50 ft., but an additional funnel was added, thus materially altering her appearance. The changes internally consist of an addition to the carrying power of 1,200 tons and additional deck space and state-room accommodation for thirty first-class and a number of third-class passengers.

Messrs. Barclay, Curle & Co., Whiteinch, who have recently launched and are still employed building steamers for the British India Co.'s fleet, have begun the laying down of two additional vessels for the same proprietary in their other yard at Elderslie (formerly Messrs. Shearer & Sons), each of about 5,100 tons capacity. Machinery for the vessels to give a fair rate of speed will be made at the Company's Engine Works at Stobcross.

Messrs. The Clyde Shipbuilding and Engineering Co., Port Glasgow, are stated to have received an order from the Admiralty for the construction of a large caisson to be employed at the Rosyth Naval Base. The firm have had previous experience in this class of work. The oil motor ship *Fordonian*, built by this firm, put back from sea in the first week of October owing to stress of weather, and on October 9th entered the dock at Greenock for machinery repairs, which were carried out by her builders.

Messrs. Dunlop, Bremner & Co., shipbuilders and engineers, Inch Works, Port Glasgow, who a short time previously launched a new vessel—the *Salerno*, of 300 ft. in length and of 2,100 gross tons—for Messrs. Thomas Wilson, Sons & Co., of Hull, have contracted with the same well known owners to build and supply with triple-expansion engines a cargo-carrying steamer of 310 ft. keel measurement. Like the *Salerno* she will be fitted by the builders with triple-expansion engines to give the vessel a good rate of speed when loaded.

Messrs. Mackie & Thompson, Ltd. The projected removal of this firm from the yard they have long occupied in Govan—now purchased by Messrs. Harland & Wolff, Ltd.—has reached the stage of being finally approved and ratified; this stage having been reached at a meeting of the Irvine Town Council on October 16th. The Provost of Irvine, who presided, said that before asking the Council to approve and confirm the draft agreement already passed in committee, they would allow him to make an authoritative statement. This Company they were dealing with was distinct from, and must not be confused with, Messrs. Mackie & Thomson from whom the proposals for forming a shipyard emanated in 1907. The concern was no doubt a continuation of that firm's business, and their present yard was the same, but it was under different management and different proprietors. The Company had been in existence since May, 1907, and its directors are—John Napier, 9, Woodside Place, Glasgow (engineer and iron merchant); George Irvine Watson, merchant, London; David Robinson, (of Robinson, Dun & Co., Ltd.), timber merchant, Glasgow; Archibald Low (of Archibold Low & Sons, Ltd.), plumber and brassfounder, Glasgow; and R. H. B. Thomson, shipbuilder, Glasgow. The manager was Mr. John McIntyre. The cost of the new undertaking apart from working capital and the value of the ground was stated in the draft agreement at approximately £50,000, and this total would in all probability be exceeded. While the capital of the Company was at present £20,000, it had been decided to reconstruct the Company, increase the nominal capital to something between £70,000 and £100,000, and alter its name to "The Irvine" or "The Ayrshire Dockyard Co., Ltd." The money required for the expenditure now to be incurred was already assured, and large orders for machinery had been provisionally placed, and the names of the directors should be enough to set at rest any dubiety that might exist as to financial standing and business connection. The Company paid during the year 1911 wages amounting to £42,000, and the Govan yard was much smaller than the Irvine yard would be, and there was no slipway in the Govan yard. The wages for 1912 bid fair to considerably exceed that figure. The orders now on hand were such that the Company would require to lay the first keel in the Irvine yard in about six months, and every effort would be made to have the yard in complete working order within twelve months from the time ground was broken. He (the Provost) now moved—"That this meeting of the Town Council approves and confirms the draft agreement between the Provost, Magistrates and Councillors of the burgh of Irvine and Messrs. Mackie and Thomson (Limited), which was approved of by the Town Council in committee on October 9th, 1912, and resolves that an agreement in terms of that draft be forthwith executed by the Town Council." On a vote being taken the Provost's motion was carried by ten votes to eight, and the agreement was accordingly signed.

Messrs. The Caledon Shipbuilding and Engineering Co., Dundee, have received an order from the Booth Steamship Co. for a passenger and cargo steamer for the South American trade. The dimensions of the vessel are:—Length, 315 ft.;

breadth, 51 ft., and depth, 25 ft. 6 in. Two other orders will be placed, it is understood, with Clyde builders by the same Company. The Caledon Company on October 7th launched a passenger and cargo steamer to the order of Messrs. Nicholas Mihanovitch (the Argentine Navigation Co.) named the *Mexico* and of 1,200 tons gross.

TYNESIDE AND WEARSIDE.

(From our Own Correspondent.)

Tyneside.

WORK in all the yards and engineering establishments on each side of the Tyne continues to be very brisk, although material is coming to hand very slowly, thus retarding work to some extent.

Messrs. Sir Wm. Armstrong, Whitworth & Co., Ltd., continue to be very busy, both with naval work and ordinary cargo ships. Both their yards are fully employed.

Messrs. Swan, Hunter & Wigham Richardson, Ltd., have on the stocks building, the torpedo-boat destroyers *Spitfire*, *Sarpendon* and *Ulysses*, for the British Admiralty, besides the *Sparrow Hawk* at the Quay. These vessels are each to be fitted with two sets of Parsons impulse reaction turbines, each driving a propeller on a separate shaft, and four boilers of the Yarrow type with small water tubes. The machinery is being made by the Wallsend Slipway and Engineering Co., Ltd. The firm have also in hand several vessels for carrying oil in bulk, two passenger steamers, besides a number of cargo vessels. The company have sustained a severe loss by the death of Alderman Charles Stephenson, the manager of the shipyard, at a comparatively early age.

Messrs. Palmer's Shipbuilding and Iron Co., Ltd. Work continues to be very plentiful with this firm, and they are employed at full pressure at both yards with new work, and have also a considerable amount of repair work on hand. They expect to have a very good year in 1913.

Messrs. Smith's Dock Co., Ltd., still continue to be busy and have in hand a large amount of repair work; all the graving docks at both sides of the river being well occupied, besides vessels repairing buoys.

Messrs. John Readhead & Sons, Ltd. The shipyard and engine shops and graving docks have work in hand to last for many months.

The Northumberland Shipbuilding Co., Ltd., have still plenty of work in hand, all their berths being occupied, and they have orders on their books to last them well over next year.

Messrs. Joseph T. Eltringham & Co. Besides new work this company have a good deal of repair work on hand, both in the graving dock and afloat.

Wearside.

The shipbuilding yards and engineering works on the river are extremely busy, such a boom in the trade has not been experienced for a considerable time, and if everything goes on smoothly, next year will be a record one for the river.

Messrs. Wm. Doxford & Sons, Ltd., are full of work, all the berths being occupied and the engine works working double time.

Messrs. Osbourne, Graham & Co. are still very busy and have in hand a high-class steamer of 2,400 tons deadweight for M. Fernand Bouet, of Caen, which they expect to finish in a week or two. Amongst other work they have a duplicate of the above steamer on the stocks, a vessel of 2,850 tons deadweight, Monitor type, for Messrs. Fearnley & Eger, of Kristiania, and another vessel of the Monitor type of 2,450 tons deadweight for well-known Bergen owners.

Messrs. George Clark, Ltd., are very busy, working night and day on a number of sets of engines for vessels building on the river.

Messrs. S. P. Austin & Son, Ltd. The large collier steamer building to the order of Messrs. Wm. Cory & Son, Ltd., London, is named *Cove*, and by the time this is published will have been launched, the launching date being October 24th; the machinery will be supplied by Messrs. George Clark, Ltd., of Sunderland. Another, and larger, collier for the same owners is being framed and preparations for a collier of fairly large dimensions are in hand for other London owners. Materials for new construction work are now coming better to hand and this yard is very busy again. Repairing work is brisk and a large number of men are engaged on the London steamer *Hawkwood*, passing Lloyd's special survey of hull and machinery, about forty plates being removed owing to damage. The Swedish steamer *Emil R. Boman* received damage to bows by striking the stonework at the South Dock whilst proceeding to sea, and has been docked with part cargo on board; a new stem and several new plates, floors and frames will be required. A local collier is due to arrive for extensive additions to her cargo-discharging facilities, and will at the same time be docked for painting and repairs.

Messrs. John Dickinson & Sons, Ltd., have orders on hand for a number of engines for vessels building on this and other rivers; they are also working double shift.

Messrs. J. L. Thompson & Sons, Ltd., have all berths occupied at their North Sands and Manor Quay yards.

THE TEES AND HARTLEPOOLS.

(From our Own Correspondent.)

Middlesbrough.

Messrs. Sir Raylton Dixon & Co., Cleveland Dockyard, continue to be very busy. They are reported to have secured the contract to build two medium-sized cargo steamers to be engined on the Tees.

Messrs. W. Harkess & Sons, Ltd., are busy, but nothing new is reported during the month other than repair work.

Messrs. Richardsons, Westgarth & Co. are very busy in all departments; amongst the new work they are reported to have secured the contract to supply the engines and boilers, of about 2,000 i.h.p., for two steamers building locally, presumably by Messrs. Sir Raylton Dixon & Co. They have also to supply the engine and boilers for a small steamer building by the Greenock and Grangemouth Dockyard Co. for Messrs. Furness, Withy & Co.

Messrs. Smith's Dry Dock Co., South Bank, have plenty of work in all departments. Amongst the new work they are reported to have secured the contract to build a steamer of about 2,300 tons deadweight from the New Zealand Steamship Co., on behalf of the Blackhall Coal Co., Ltd., Christchurch, New Zealand, and to be engined on the Tees.

The Tees Conservancy Commissioners have contracted with Messrs. J. P. Rennoldson & Sons, South Shields, to build a paddle-tug about 115 ft. long to Board of Trade requirements, also a screw tug of about 100 ft. long to Lloyd's requirements.

Messrs. Hughes, Bolckow & Co., Ltd., have bought the s.s. *Midnight Sun*, 3,178 gross tons, from the Albion Shipping Co., Ltd. (J. S. Pearson, manager), Newcastle-on-Tyne.

A new Company, the Aktiebolaget Asker, Christiania, has contracted with a Middlesbrough firm to build two 8,000-ton deadweight steamers to run between England and America.

Stockton and Thornaby.

Messrs. Craig, Taylor & Co. are still very busy, and although no new orders have been booked, they expect a repeat order from a West Hartlepool firm, who have recently sold one of their steamers.

Messrs. Richardson, Duck & Co. and **Messrs. R. Ropner and Sons.**—Although neither firm has secured any new work during the month, they have plenty to keep them very busy for some time to come.

Messrs. Blair & Co. are very busy in all departments. They are reported as having secured an additional order to supply the engine and boilers for a local steamer building.

West Hartlepool.

Messrs. W. Gray & Co. continue to be busy at both the old and new yards. They have just finished the very extensive repairs to the s.s. *Time*, that was so long ashore on Seaton Carew sands. They are reported to have secured the contract to build a medium-sized cargo steamer for local owners.

Messrs. Irvine's Shipbuilding & Dry Dock Co., Harbour Dockyard, are engaged on both new and repair work. No new orders are reported, though they expect to secure the order to construct a small steamer for foreign owners.

Messrs. R. Hardy & Co. have sold the s.s. *Uplands*, 2,275 gross tons, to foreigners through Messrs. H. E. Moss & Co., also the s.s. *Headlands*, 2,988 gross tons, to French shipowners.

Hartlepool.

The Central Marine Engine Works of Messrs. W. Gray & Co. are very busy in every department. They have to supply the engines and boilers for the cargo steamer to be built by them for the Holland-Amerika Line, Rotterdam, similar to the steamer recently bought by them from Messrs. Stick and Co. They have also a large amount of forge-stamping work on hand.

Messrs. Irvine's Shipbuilding & Dry Dock Co., Middleton Yard are very busy in every department; the three very large steamers on hand requiring an extra amount of work, has decreased their output, but their tonnage will be very heavy. No new orders are reported during the month.

Messrs. Richardsons, Westgarth & Co., Ltd., continue to be very busy, and a night-shift has had to be commenced again which was stopped owing to the coal strike. They are reported to have secured an order to supply the castings for a large twin-screw steamer building abroad, also the engines and boilers for a steamer to be built in Holland for a Liverpool firm. They are very busy with condensing plants, all on the Contrafio system.

THE HUMBER AND DISTRICT.

(From our Own Correspondent.)

Trade of Hull.—The docks are very congested just now, more especially the Victoria Dock, with wood cargoes from the Baltic and White Sea, and the Railway Companies cannot find enough rolling stock to despatch the wood into the Midlands. The Alexandra Dock is fairly busy with steamers from India and Buenos Ayres, with grain cargoes, etc. The New York, Boston, and Montreal trades are delivering large cargoes of American and Canadian produce. Several steamers in the Black Sea for Hull are stopped owing to the war.

Goole Docks.—The new coal-hoist erected on the quay of the new west dock was placed in commission on the 15th October. The hoist has been built to the order of the Aire and Calder Navigation, and will considerably facilitate the shipment of coal at Goole. It will deal with the compartment boats (or small barges) of the Aire and Calder Navigation. The loading capacity of the hoist will be between 100 and 250 tons per hour; at present it is to be used for the loading of the lighter craft that comes to the port. A finely-modelled wooden schooner of 100 ft. by 22 ft. by 8 ft. has just arrived at Goole from the builders, Messrs. Smith and Co., Ltd., of Rye, Sussex, to the order of Messrs. R. Earnshaw & Co., Ltd., and will be employed in the coasting trade, the vessel will carry about 222 tons and is named the *Martinet*. The s.s. *Rose*, of Glasgow, late of the Laird Line, has recently arrived. This vessel has lately changed hands to Goole owners, for the Continental and coastwise trade.

Wilson Line, Hull.—Commander Cowlrick, R.N.R., late of the R.M.S. *Eskimo*, of the Wilson Line, has been appointed the Marine Superintendent for the Company. This gentleman entered the service of the Company many years ago as junior officer, and soon worked his way up to master, and is a man who will certainly command the respect of all the officers and masters of the Company. The Directors have no doubt chosen the right man to fill this responsible position.

Messrs. Central Dry Dock Co., Ltd., have been very busy during the past month. The s.s. *Tynedale*, of Belfast, is now in the firm's own dock, and will probably be in for five or six weeks. The steamer went ashore at the Isle of Wight on her voyage to Hull, and damaged her bottom very considerably, the damage necessitating the removal of nearly 100 plates, including half that number to be renewed. The work naturally entails renewal and repairing many floors, frames, etc., and the boilers and machinery are to be opened out for Lloyd's inspection. Deck repairs are also proceeding. The firm as usual, have had to engage the Railway Company's graving docks, and have docked the following steamers:—*Blackfriargate*, s.s. *Willey*, s.s. *Valhal*, s.s. *Romera*, s.s. *Corsinia*, s.s. *Archbank*, and the sailing-ship *Abyssinia*, besides many other steamers in the docks, opening out for surveys for Lloyd's and the British Corporation Surveys. The firm's own graving dock is well booked ahead, and the prospect seems very good for November.

Messrs. C. D. Holmes, Ltd., engineers and boilermakers. This well-reputed firm keep on securing new orders for boilers and machinery for trawlers, coasters, etc. Their several departments at the engine works are kept at full pressure, likewise the boiler and smiths' shops. They have just sent away five trawlers on their trial trips and handed them over to their respective owners, each vessel being very satisfactory. The firm's outside staff have been kept fairly well employed on repair work on local and outside firms' steamers. The Company are turning out a great number of their patent trawl winches, which are giving good results both to home and foreign owners.

Messrs. Amos & Smith, Ltd., engineers and boilermakers.—All departments connected with this Company are fully employed. The machine shop is working night and day to complete the orders in hand. Four sets of triple-expansion engines, boilers and auxiliary engines, and winches for trawlers have been booked. The Branch Shop at Alexandra Dock is very busy with general repair work and graving dock work for local and outside steamship owners.

Messrs. Woodall & Co., engineers and boilermakers, have been fairly well employed during the month on the following steamers:—s.s. *Arnold*, s.s. *Thorsa*, s.s. *Falstad*, s.s. *Guldborg*, s.s. *H. C. Anderson*, s.s. *Otern*, s.s. *Comet*, s.s. *Sjoyna*, s.s. *St. Petersburg*, s.s. *Symra*. Also with forgings for the L.C.C. and Blackpool Corporation Tramways, contracts for Hull Corporation, and erection of hydraulic crane for the Hull Fruit Export Company, Admiralty forgings for Messrs. Bellamy, Ltd., Millwall, and for Hull Tramways.

Messrs. Earles & Co., Ltd., engineers and shipbuilders.—This firm is very busy building new steamers for home and abroad. They have just launched a very large steamer for a Dutch Company, which is to be fitted out as a first-class passenger boat, to run between Java and the Colonies. The s.s. *Withernsea* has run her trials, loaded coals and sailed for Port Said, and the owners are highly pleased with the steamer's performance on her trials. A second steamer, s.s. *Portsea*, will be launched in a few days for the same owners, namely, Messrs. Brown & Atkinson, of Hull, for their general trades. The two new steamers building for the Wilson Line will be launched in due course for the Company's Mediterranean general cargo trade. The Company is well employed with the patent slips and general repairs.

North-East Coast Engineering (Works), Ltd., have been very busy during the month on the following steamers:—s.s. *Corby*, s.s. *Labrian*, s.s. *Linaria*, s.s. *Kaethe*. The *Corby* has been in graving dock and sundry repairs executed. *Labrian* has been in graving dock, new propeller fitted and extensive repairs to bunkers on account of fire. The *Kaethe* has been in graving dock and completed large damage repairs and fitted new stem. *Linaria*, sundry repairs in engine and stokehold.

Messrs. Stewart & Craig, engineers and ship repairers, have had a busy time on the following steamers, executing repairs:—s.s. *Vally*, s.s. *Ibis*, s.s. *Willy*, s.s. *Cora*, s.s. *Donnington Court*, s.s. *Rondane*, s.s. *Escolbrook*, s.s. *Abyssinia*, s.s. *Buckminster*, s.s. *Symra*, sailing-ship *Autun Mica*, etc.

Messrs. Cochrane & Sons, shipbuilders, Selby.—This Company is still booking and executing orders for drifters, trawlers, tugs and coasters for Hull, Grimsby, Fleetwood, Milford, Iceland and Russian owners. They have several trawlers now at Hull Docks receiving their engines, boilers and auxiliary machinery, and preparing for their trial trips, before being handed over to their respective owners.

SOUTH OF ENGLAND AND ISLE OF WIGHT.

(From our Own Correspondent.)

Dredging at Southampton.—A further dredging scheme has been decided upon by the Harbour Board in regard to the "swinging ground" *i.e.*, a spot near the entrance to the new wet dock where the White Star vessels get into position

for proceeding down the channel. This additional dredging is very much required, and it is hoped that the Channel will also be widened so as to prevent any repetition of the incident which marked the departure of the *Titanic*, when the *New York* broke her moorings and drifted out nearly on to the former vessel. Berths Nos. 36 and 37, which are used by the German companies' vessels sailing from the port, also come under the new scheme, and when the additional dredging here is completed it will make another very desirable improvement.

R.M.S.P. "Dart."—This vessel, which has been built and engined by Messrs. Cammell, Laird & Co., at their Tranmere Yard, Birkenhead, sailed for Buenos Ayres on the 12th of last month. A sister vessel is building at the same yard. Both vessels will be stationed at Buenos Ayres and will bring chilled and frozen meat down the river to the mail steamers. They are propelled by twin-screw engines and have large refrigerated holds thoroughly equipped for the rapid handling of the cargo. The refrigerating installation is by the Liverpool Refrigeration Co., and is on the ammonia compression system.

Messrs. John I. Thornycroft & Co., Ltd., Woolston Works, Southampton.—H.M.S. *Hardy*, *Paragon*, *Porpoise*, *Unity*, *Victor*, *Daring* and *Dragon*. Work is proceeding satisfactorily on these destroyers, and the *Hardy* was launched successfully on the 10th of last month. H.M.S. *Sturdy* and *Strenuous*.—These vessels are well advanced, and the fitting up of the accommodation, etc., is in progress. Shallow draught ferry steamers.—The erection of the hulls of these vessels is nearing completion. Satisfactory progress is being made with the Diesel-engined yacht. Passenger and Cargo Steamer for Trinidad.—The keel of this vessel is laid, and the erection of the frames, floors and beams is proceeding. Satisfactory progress is being made with the motor passenger vessel for New Zealand. The keel has been laid for a composite cargo vessel for Peru. New Work.—The firm have received orders from the Canadian Government for an armed patrol cruiser for customs service, and from Trinity House Corporation for two lightships. The usual general engineering jobs have gone through the shops and the repairs department has been well occupied with work for dockyard craft, troopships, liners and various yachts.

Messrs. Day, Summers & Co., Ltd., Northam Ironworks, Southampton.—The s.y. *Jason*, 750 tons, building for Mr. Frank Bibby, was launched on the 26th September, and last month was under the large sheers completing fitting out and the boilers were ready for shipment. The 70-ton tug boat for Messrs. Liebig's Extract of Meat Co. was successfully launched about the end of last month. The pontoon for Messrs. C. H. Walker & Co. for a set of 60-ton floating sheers was despatched last month. The sheers are completed and awaiting orders for shipment; also the material for the pontoon for Messrs. Pearson & Sons' 60-ton sheers was delivered at the yard last month. The firm are busy with a large number of turbine castings for Messrs. J. Samuel White & Co., of Cowes. The dredger *Devon* (owners Messrs. Topham, Jones & Railton) is undergoing repairs and strengthening prior to her voyage, as she has been chartered by Sir John Jackson & Co. for foreign contract. The Motor Yacht Club's houseboat *Enchantress* was on the slip last month, having new copper sheathing fitted round the water line. The Admiralty paddle tug *Dromedary* has completed repairs and left the yard. Several vessels were slipped last month, and some have taken up mud berths for the winter. Also several yachts have gone through survey.

Messrs. J. Samuel White & Co., East Cowes, Isle of Wight.—The Chilian destroyer *Tome* was launched last month and is now receiving her machinery. The fire float for the London County Council has completed her trials and will shortly be delivered. Last month the first of three steam barges for the British Admiralty was delivered at Devonport under her own steam.

Messrs. Simpson, Strickland & Co., Ltd.—The above firm are fully occupied at present in all departments and have a large number of craft of various types in hand. Four 30-ft. steam launches are in hand to have triple engines and oil-fired water-tube boilers for the White Star line. Two 85-ft. motor barges are on order for a West of England firm, also a 64-ft. tug and a nice 55-ft. launch for South America. A high-class 25-ft. launch for the s.y. *Sabrina* and two 50-ft. steam pinnaces for the British Admiralty are in hand, in addition to a large amount of machinery and repair work. During last month a large number of yachts have been hauled up for the winter, and the schooner yacht *Astraea*, recently purchased by a French gentleman, is going to have considerable alterations and improvements carried out by the firm.

THAMES.

(From our Own Correspondent.)

Shipping.—The Royal Mail Steamship Co.'s new vessel, the *Desna*, has been delivered and put into service. She is of 11,500 tons, with dimensions of 517 ft. long by 62 ft. broad, and is a twin-screw with engines arranged on the "balanced" principle for reducing vibration. With the great rise of this company it is to be regretted we have to report the death recently of the secretary, Mr. C. E. Davies, at the early age of forty-nine. The New Zealand Shipping Co. has issued its report, which shows the good times the company is experiencing. The nett profit for 1911-12 is £95,793, which is £40,000 above that of the previous year. It must be noted, however, the company purchased a controlling interest in the Federal Steam Navigation Co., and also the Australian business of Messrs. Houlder Bros. & Co., with four steamers since disposed of.

New Construction.—We have to report an order received from the Admiralty for the machinery of two new cruisers by the Thames Ironworks Co.; this will be a source of satisfaction to the efforts of the company as well as to the workers concerned.

The Baltic Shipping Exchange. The chairman of this body, Major Bridges Webb, in the presence of Sir Thos. Sutherland and well-known shipowners, has unveiled in the Exchange a bust of the late Mr. Edward Pembroke, the senior trustee, and for sixty years one of its most popular members. For the purpose £2,100 was raised, and the balance of £1,800 was devoted to foundations for the maintenance of fatherless children in the Royal Merchant Seamen's Orphanage at Snaresbrook.

L.C.C. Grant for training Boys for the Sea.—This matter has come before the Council for the first time, and there is a possibility now that the subject is ventilated that something may really be done towards subsidising such training, especially as the Government has expressed its willingness for the Board of Education to contribute towards such a grant if certain proficiency were attained. The Council consider the cost in approved training ships would be £25 to £30 per annum for each boy, and a two-years' course would be necessary. The importance of the subject was emphasized by Lord Mersey's report on the *Titanic* disaster, and it is pointed out that 5,000 boys trained annually should be the object aimed at for efficiency, beginning, of course, in a small way and leading up to this end. Now that Government approval has been signified something may follow, and for the sake of the merchant service this end is greatly to be desired.

The Marine Society and Trafalgar Day.—On the occasion of the celebration of Nelson's victory this Society held its meeting of the Court of Governors at Clark's Place, Bishopsgate, and in the afternoon Prince Louis of Battenberg inspected the boys of the *Warspite*, maintained by the Society, in the Admiralty Courtyard. The work of the Society is well known, and includes the training of boys both for the mercantile marine and for the Navy.

MERSEY AND MANCHESTER SHIP CANAL.

(From our Own Correspondent.)

ADDITIONAL interest in the Balkan War has been imparted locally by the fact of the acquisition by Greece of four destroyers, which left the Mersey on October 4th, with local crews, for the Piræus. While no new tonnage has been placed, enquiries are fairly numerous.

Messrs. Cammell, Laird & Co. Great activity prevails upon the important Vulcan Dock work now in hand by the firm. H.M.S. cruiser *Minotaur* has recently docked and is now in the wet basin receiving her finishing touches preparatory to trials. H.M. super Dreadnought *Hercules* is under the 150 ton crane and is receiving her machinery and armour plates. The keel of the Norwegian Atlantic liners is fast approaching the launching stage while the large quadruples sets of engines are in an advanced state of erection in the shops. In contrast to the class of work the Pacific Steam Navigation Company's meat barge *Dee* left the basin for sea trial on October 11th and left the same day for the River Plate. This vessel is of unique design, being about 200 ft. long and with a beam of 44 ft. and will carry 500 tons of dead meat and is intended to bring refrigerated cargoes down from the upper reaches to the sea board. A similar vessel to be named *Don* is at present under construction at the Birkenhead yard. The four 32 knot destroyers building for the Argentine Navy at Messrs. Cammell, Laird & Co. were purchased by the Greek Government and after preparation for sea left for Greece on October 4th. These destroyers whose names were changed and on board of which a Greek religious service was held, are renamed the *Leon*, *Panther*, *Lynx* and *Falcon*, were previously known as the *S. Luis*, *Santiago*, *Santa Fe* and *Tucuman*. Along with the Chinese cruiser acquired from Messrs. Armstrong Whitworth & Co. they will be valuable additions to the Greek Navy. Some interesting features of these vessels are as follows: Length 285 ft.; breadth, 27 ft. 9 in.; draft 8 ft. 6½ in. Combined impulse and reaction turbines, with the astern turbine combined in the same casing, drive twin screws. Steam is supplied by four White Forster water tube boilers one being oil-fired. The armament consists of four 4 in. quick firing guns also four 21 in. torpedo tubes. The propelling machinery for H.M.S. *Iron Duke* is being rapidly advanced, this vessel having been launched on October 12th at Portsmouth. The repair department have been fully employed. The Peruvian transport *Iquitos* is in for overhaul. The steam trawler *Doris* has had new furnaces fitted. The sailing ship *Edmond Rostand* is in for survey, while the steamer *Pastikka* is still in hand due to grounding.

Messrs. H. & C. Grayson.—This old-established firm preserve their reputation for being proverbially busy. Great attention is paid to the maintaining of an up-to-date plant, and careful supervision, which results in contracts being fulfilled in a minimum time. Messrs. Grayson have launched from their Garston yard a motor vessel, the *Silver Queen*, while auxiliary propelling machinery has been fitted to the sailing ship *Earlshall*. The Dock Board's tender *Vigilant* has had extensive machinery repairs, while a novel craft for the same owners has also been launched from the same yard. This is a steel tender barge for use at the landing stage and consists of a steel hull, 52 ft. by 20 ft. by 10 ft. A superstructure consisting of 12 inch baulks of timber take the pressure of a steamship coming alongside. The superstructure is separate from the steel structure, except the centre baulk which is a component part of the barge. It has been constructed to the specification and design of Lieut. Mace, the Board's Water Bailiff. Extensive repairs have been carried out to the *Star of New Zealand*. This vessel was recently in collision with the *Shore Bloom*, and was beached off Holyhead. The steamers *Artificer*, *Vestal*, *Baldwin* and *Majestic* have also been in hand for general repairs.

Messrs. Harland & Wolff's New Works.—At a recent meeting of the Bootle Town Council, the terms of the agreement for the supply of electricity to Messrs. Harland & Wolff were approved and adopted. The agreement is for five years, and the cost of the necessary machinery and plant will be £1 500. It is understood that the plant will be fitted up on the Company's land.

The Navigation of the Dee.—At a meeting of the Flintshire County Council held on September 25th it was stated, in connection with a scheme for improving the navigation of the Dee that of the £75 000 required, the sum of £45,000 had already been secured. It is a matter of great local importance that these steps are at last to be taken.

Coal Mining at Neston. Another matter of importance, and one which will benefit greatly by any improvement in the Dee navigation is the development of the Neston Colliery. This Colliery has been taken over by a number of Wigan gentlemen. The output is steadily increasing, and the coal, which is of good quality finds a ready sale.

The Mersey Bunkering Co. This Company have established a novel bunkering station in the Mersey. The hulk *Enterprise* has been moored off Rock Ferry and is fitted up with a patent trunkway and tip buckets. Dredgers, cross Channel steamers and any vessel requiring a quick turn round can coal without going into dock. 24 tons of coal have been tipped and trimmed into bunkers with eight men, against 10 tons with twenty nine men using bags. This Company's offices are in Brown's Buildings, Exchange, Liverpool, Mr. J. F. Makinson being the manager.

Birkenhead Chamber of Commerce.—This newly formed Chamber of Commerce held a dinner at the Town Hall on September 26th Mr. A. W. Willmer, president of the Chamber and late Lord Mayor of Birkenhead in the chair. Various suggestions were made for improving the railway and shipping facilities. Birkenhead's importance as a cattle importing centre may be realized when it is stated that 17,000 sheep, 5,000 cattle and 2,000 pigs are imported from Ireland only each week. The Dairages of the port are second to none in the Kingdom.

NORTH-WEST OF ENGLAND.

(From our Own Correspondent.)

Barrow-in-Furness. — **Messrs. Vickers, Ltd.**—Very great changes have been taking place in the shipbuilding department of Messrs. Vickers, Ltd., during the past two months. Mr. W. T. Davies, of the Admiralty, has been appointed Shipbuilding Director in the place of Mr. J. H. Boolds. Mr. Davies, who is forty five years of age, has had all his experience under the Admiralty. He was apprenticed for five years at the Portsmouth Dockyard, and then went to the Royal Naval College at Greenwich, where he took the higher courses of training in naval architecture. He left there in 1890 and became a member of the Royal Corps of Naval Constructors attached to Portsmouth Dockyard. Subsequently he was placed in charge of the drawing office at Portsmouth, and in 1902 he was promoted to the rank of Constructor at the Admiralty, where he assisted Sir Philip Watts in the designing of the *Dreadnought*, the super-"Dreadnoughts," and the huge battle-cruisers which have lately evolved from the Admiralty. He comes to Barrow at a time when the yard is filled with heavy and light naval orders, and he will find plenty of work for his energies. Mr. Glen, late of Messrs. Palmer's works, and previous to that, under shipyard manager at Barrow, has been appointed shipyard manager in the place of Mr. J. H. Brown. It is confidently expected that, with the aid of a new installation of all classes of tools designed to deal with heavy plates, the Company will be able to turn out a much greater annual tonnage of shipping than has hitherto been possible.

New Orders.—Orders for three Admiralty ships have been booked during October. To begin with they have been commissioned to build two light armoured cruisers of the "Town" class, and they had the chance of building a third, but their hands were too full of other work to enable them to accept this third ship, the order for which has gone to the Fairfield Company. Then the Admiralty has placed with the Vickers' firm the order for a vessel to carry oil fuel to H.M. ships at sea. This craft will have tanks to carry 8,000 tons of oil fuel. Her twin engines, which will be of 2 500 horse-power, will be driven by oil fuel. They will be of the four-cycle cross-head type, and each engine will have eight cylinders. The Company are already building the heavy-oil engines for one of the two 2,500-ton vessels which are to be employed in taking out oil fuel to the fleet, and have more thoroughly gone in for oil-fuel engines than any other firm in the trade. As a result they have designed an engine of their own which has been accepted by the Admiralty. The engineering experts employed in this department are sanguine there is a great future for the heavy-oil engine, and the firm is effecting arrangements to be ready for this new and important development in ship propulsion.

Progress of Work.—The Vickers' Company have a plenitude of orders in hand, and the work in progress is making very satisfactory strides. This is particularly shown in

the case of the Japanese battle-cruiser *Kongo*, which is being fitted up in the Buccleuch Dock. She will be ready for her trials about March next, and about that time the British super-" Dreadnought " *Delhi* and the Turkish battleship *Reshad V.* will be ready for launching, and will both need the facilities afforded by the 200-ton crane. The three Brazilian " Monitors " are all in progress of construction and will be ready for launching early in the New Year. The Montreal Dock is reported to have reached the Gulf of St. Lawrence.

Submarines. There are no fewer than thirteen submarines in course of construction for the Admiralty at Barrow. These vessels are of a large type, and are regarded as far away in advance of any other class of submarine yet designed. Further than this, by the use of heavy-oil engines, these submarines are not now subject to gasoline explosions, and they are, therefore, regarded as thoroughly safe for those who man them. The submarine department has been very considerably enlarged of late, and it is now capable of doing three times as much work as it could do previously. There is no scarcity of orders, and the men in this department are busy and likely to be for a long while to come.

Shipbuilding Material.—There is a very full demand for shipbuilding material, and prices have gone up considerably. Ship plates are at £8 5s. per ton, and boiler plates £8 15s. to £9. Makers are very fully employed.

The Hæmatite Market.—The demand for hæmatite iron is very full and very firm, and prices are at 85s. for mixed Bessemer Nos. nett f.o.b., and 82s. warrant sellers cash.

BELFAST.

(From our Own Correspondent.)

Work in Hand.—According to Lloyd's returns for the quarter ended 30th September, there were twenty-five steamers under construction in Belfast, with an aggregate gross tonnage of 315,550, as compared with twenty-four steamers with a gross tonnage of 292,350 on 30th June last, and twenty-four steamers with a gross tonnage of 253,808 on 30th September, 1911. The Belfast shipbuilders have every reason to be highly satisfied with these figures, and with further important orders booked ahead there is every prospect of the present boom continuing for a long period.

Messrs. Harland & Wolff. On 10th October, there was launched from the south end of the Queen's Island a new twin-screw steamer named *Appam*, built to the order of the British and African Steam Navigation Co. The new vessel is 425 ft. long, 57 ft. beam, and has a gross tonnage of 8,000. The propelling machinery consists of two sets of quadruple-expansion engines. The *Olympic* arrived early in the month to lie up for the extensive structural and other alterations which are to be carried out. It is expected that the vessel will be off her station for about five months. Messrs. Harland & Wolff have also the Hamburg-American liner *Hamburg* in hand for repairs, which include the fitting of a new stern-frame. The repair work which they have in hand also includes a general overhaul of Lord Pirrie's magnificent steam yacht *Valiant*.

Messrs. Workman, Clark & Co. launched, on 27th September, a twin-screw steamer named *Hawke's Bay*, which they have built for the Tyser Line. She is 486 feet in length and has a gross tonnage of 10,600. She has been specially designed for the frozen meat trade, whilst accommodation will be provided for about 750 steerage passengers. The propelling machinery consists of two sets of triple-expansion engines, steam being supplied by four single-ended boilers working under forced draught. As regards repair work, Messrs. Workman, Clark & Co. have, in addition to the Lamport and Holt liner *Veronese*, referred to in last month's notes, Messrs. Clark & Service's *Ardandearg* in hand for repairs of a fairly extensive nature.

REVIEWS.

Steamship Navigation. by Mr. H. F. Arnold. London: Messrs. Blackie, Sons, Ltd. 1912. Price 1/6.

THIS is a little book on the subject of navigation, which partakes of a didactic character. It may be said to embrace in simple form the lessons that are required by anyone first making a study of the art. Though the title would lead us to suppose there was a special connection with steamships we should rather say a better heading would have been "Easy lessons in navigation." The definitions appropriately are found at the opening and then with descriptions of the compass and sounding machines with the log and instruments employed on shipboard, we are taken through the mysteries of swinging a ship and correction of courses, and then to the different forms of sailing used by the navigator. The day's work, that very important item in a mariner's progress, appears next, followed by constructional chart work and examples of the making of these as issued from the Admiralty Hydrographic Department. A few pages of examination tests conclude this handy work, which may be found very useful to many who do not require a profound knowledge of the subject, but merely a grounding in some of the elementary principles.

Practical Design of Marine Single-ended and Double-ended Boilers. By Mr. John Gray. London: Messrs. Constable and Co., Ltd. 1912. Price 5/- nett.

THIS is a book by a practical draughtsman intended for use in an office where, while there may be practical acquaintance with boiler design, there is a lack of experience of large marine boilers, and we can imagine therefore the possible want there is for a volume of this kind. The illustrations interspersed with the text show what ought to appear on the drawing, according to the author's opinion. It is well known that furnace details are very important in a marine boiler, and here we find the actual methods of setting them out. It is shown clearly where the survey rules must be followed and how applied. Having said all that seems necessary to say about the ordinary single and double ended boiler, many details being the same for each type, there is in addition a description of the Inglis patent system of boiler which gives a common return flue before the gases finally pass through the return tubes or three times through the boiler. We next find a complete series of tables of all that would be likely to be wanted by the draughtsman and many of these we do not remember before to have seen in print, such as heating surface of boiler tubes and grate areas of furnaces. There are several data tabulated of a miscellaneous character, rendering the book, we consider, for those for whom it is intended a most valuable aid and which an up-to-date designer ought not to dispense with if engaged in a large marine practice.

Guide to the Mercantile Marine. By Mr. R. A. Fletcher. London: Sir Isaac Pitman & Sons, Ltd. Price 1/6 nett.

THIS is a handy little guide by the author of "Steamships and their Story," to all who wish to join the mercantile marine. Though the author has been assisted in the compilation of this work by the Board of Trade, the Shipping Federation, officials of training ships and various shipowners, the book must not be taken as an official publication. The best advice the author has been able to obtain is included in the pages of the volumes for those who wish to enter the mercantile marine, either as an apprentice or starting before the mast. Those whose desire it is to become deck hands, firemen, stewards or cooks will find the way here made clear to them. A chapter is devoted to the marine engineer, detailing the procedure and qualifications necessary to become a member of this branch. Other chapters deal with the training ships, the Marine Society, colour blindness and the sight tests, and the volume closes with a list of shipowners who take apprentices. The book, which is nicely printed, contains ten illustrations, mostly of training establishments.

Weather Signs and How to Read Them. By Mr. Wm. Allingham. Glasgow: Messrs. James Brown & Son. Price 2 nett.

THIS little work by Mr. Allingham, nautical assistant, Meteorological Office, has been written not for experts, though the author says they may find something new in the volume, but for the comparatively young members of the merchant navies. It has been the effort of the author to make the information clear and simple so that it may be easily retained in the memory, and in the hope that the study of this experimental work will induce a still further pursuit of the subject. The author has taken great care in the treatment of the matter and has produced a very readable work. One of the chapters deals with the necessary meteorological instruments for use

at sea, and among the chapters may be mentioned those on ship's meteorological registers, average atmospheric pressure, air and sea temperature, storm signs, popular weather signs and cloud forms and signs. In connection with the latter the book contains eleven reproductions of photographs showing cloud forms and in addition there are twelve other illustrations included in this book of 117 pages.

Engineers' and Shipbuilders' Accounts. 2nd Edition. By Mr. Francis G. Burton, I.S.A.A. London: Messrs. Gee & Co., Ltd. Price 3/6 nett.

THIS work is one of a series of handbooks issued under the heading of "The Accountant's Library," and provides detailed information as to the most approved methods of keeping accounts in relation to an engineering or shipbuilding business. The present volume is No. 14 of the series, in which are comprised fifty-one volumes. Mr. Burton, who was formerly secretary and general manager of the Milford Haven Shipbuilding and Engineering Co., Ltd., and, consequently, should know his subject very well, has produced a comprehensive book on engineers' and shipbuilders' accounts, his chapters dealing with materials and stores, salaries and wages, manufactured goods and contracts, cash book, depreciation, establishment charges, ledger, trade account, balance sheet, audit, cost accounts, etc. The business of a shipbuilder or engineer presents peculiar difficulties in connection with accounts as in the same yard there are different trades—shipwrights, moulders, machinists, platers, riveters, pattern makers, etc., etc., all of which require classification as to cost and value of the work of each branch. The work contains a number of specimen accounts, and Mr. Burton's book should go a long way in assisting an accountant to satisfactorily keep the books of such an intricate business.

Repertoire General—General List of Merchant Shipping of all Nations, 1911-1912. Two volumes. Subscription £3 3s. p.a., or separately Steamers and Motor Vessels, £1 14s.; Sailing Vessels, £1 10s. p.a. London and Paris: The Bureau Veritas International Registry of Shipping.

THE forty third annual issue, for 1912-1913, of this well known work is represented by two very handsome and well-bound volumes, one of the volumes being devoted to steamers and motor vessels and the other to sailing vessels. The value of the volumes as a work of reference which no firm connected with the maritime world can do without, is evidenced by the fact that the compilers have included lists showing the particulars of sea-going vessels of whatever nationality of over 100 tons (steamers) and 50 tons (sailing vessels). These particulars consist of the dimensions, tonnage, rig, nationality, date and place of building, name of builders, style of construction, means of propulsion, dimensions and power of engines, pressure of steam, name and residence of owners, port of registry, signal letters, and name of master. Its utility, therefore, cannot be denied. Further than this, there are other sections of the work giving general statistics of tonnage afloat according to each flag, statistics of vessels built, bought and sold in the principal countries. A number of useful lists are given, comprising cable steamers, steamers carrying petroleum in bulk, changes of names, and an alphabetical list of steamers arranged according to tonnage. In addition we have an alphabetical list of iron and steel shipbuilders throughout the world, and lists of steamship and sailing ship owners arranged according to nationality with the names and tonnage of their vessels. Particulars of dry docks, patent slips, floating dry docks, etc., in all ports of the world are also given. In the volume dealing with sailing vessels separate lists of these vessels fitted with auxiliary engines and motors are given. The "Répertoire Général" is excellently produced and is published by the Bureau Veritas, which has been in existence since 1828 as a society for the classification of vessels, at their head office in Paris, No. 8, Place de la Bourse, and in London at 155, Fenchurch Street.

Philips' Chamber of Commerce Atlas. London: 32, Fleet Street, Messrs. George Philip & Son, Ltd. Price 6/- nett.

THIS well-known firm of map makers have recently issued an atlas which they describe as a graphic survey of the world's trade, with a commercial compendium and gazetteer index. The atlas presents in concrete form a great amount of information which would otherwise be only obtainable after much wading among innumerable books. The first six sections of 128 pages of coloured maps illustrate every aspect of commercial enterprise throughout the world. Care has been taken to show the necessary detail embodied on the maps in the clearest manner, and as far as possible all information relating to a country is shown at one opening, thus avoiding cross references and searching elsewhere. A series of general maps of the world depict the more important commercial and economic aspects of geography, and this series includes charts showing the commercial highways by land and sea, telegraphic and postal maps, the commercial development of the world, emigration, currencies, tariffs, etc. The sources of supply of the principal commodities and the direction of their export is shown in a separate series, and the markets of the world are shown in a manner to indicate the commercial regions of the world at present exploited or neglected by the British exporters. The world's trade is shown in map and diagram and a complete series of commercial maps is given, exhibiting the natural resources, industries and means of communication of all the countries of the world. A feature of these commercial maps is the inclusion of tables of distance and time by rail and sea. The names of the steamship companies trading between the countries are also given. A commercial compendium includes the source and nature of commodities of commercial importance and supplementary tables summarizing the trade of the world. This useful atlas ends with a gazetteer index of 6,300 names.

Speed and Consumption of Steamships. By Lieut. J. F. Ruthven, R.N. London: Mr. J. D. Potter. Price 4s.

THIS book is a compilation of statements and formulæ, the product of a long period of practical experience, with the view that they may be found useful to the rising generation of navigators and sea going engineers. Much of the substance of these pages has already appeared in the shape of short papers in the "Nautical Magazine," and in the journal of the Royal United Service Institution; these have now been collated, and with the addition of a good chapter upon stability make the whole collection a reference book of merit. In the first article on speed and consumption it is pointed out that these two factors are closely related, and the reader is induced to consider speed in relation to the amount of fuel on board and to ascertain that there is sufficient fuel to enable the vessel to reach port. Some examples are given of a vessel which had left Galle for Aden in the South-west Monsoon and had to put her helm up and crawl back because it was found when less than half-way across, that over half of the coal was used, and that the vessel could not hope to complete the passage against wind and sea. The author includes a set of rules by which the engine-room counter can be relied upon to ascertain the speed of the vessel after allowing for slip, which, however, is a matter of judgment when the wind is taken as head or following and the state of the sea is noted. A set of rules is given by which the consumption can be calculated, both for the main engines and auxiliaries, and these rules are all given in such a manner as to be simple and clear to readers of the book. The chapter upon stability is very well explained. Sea going engineers and navigators have in this publication an excellent book, care having been taken to explain the points clearly in order to make them easy to the understanding.

The Una-flow Steam Engine. By Prof. J. Stumpf, of Charlottenberg. London: Constable & Co., Ltd. Price 10s. 6d.

THIS is an educational text-book written by Prof. Stumpf and translated by Mr. P. S. H. Alexander, upon the advantages offered by engines which, though the steam is of high pressure, or may be superheated, locates the heating by the cover at one or both ends of the cylinder, and has a centre portion of a low temperature which corresponds with the exhaust. The volume is very well illustrated in the last portion of the book, showing engines made on this principle during the last three years by various firms in Germany for different purposes, all fitted up by local firms in various countries. The object of the book is to show the advantage of unidirectional flow, or una-flow, as it is termed, of the steam, which is admitted at the ends of the cylinder, and there superheated if needs be. The exhaust being situated at the centre of the cylinder, is made the ends of the travel of both sides of the piston which is constructed as a long cylinder, and to which the escape of the exhaust is permitted, by the said long cylindrical piston passing over the exhaust ports, which are arranged all round the cylinder,

and are opened and closed by the piston. The arrangement of these ports being that the steam never comes back to the steam admission ports, enables the exhaust ports to be of any size. In reverse flow engines this is the difficulty, as the same ports are used for the steam admission and for its exit. As regards the jacketing this is confined to the covers and to a small area about the ends of the cylinder. Thus there is no contact between the wet exhaust steam and the live steam jacket. As a result it has been found that the una-flow engine acts as regards efficiency as well with a single cylinder as a compound engine with two cylinders. Illustrations and diagrams show the different adaptations of the una-flow engine, the illustrations comprising an excellent series of cross sections showing how the una-flow engine may be designed for different purposes.

A Pocket Book of Marine Engineering Rules and Tables. By Mr. A. E. Seaton, M.Inst.C.E., M.Inst. Mech. E., M.Inst. N.A., and Mr. H. M. Rounthwaite, M.Inst.M.E., M.Inst. N.A. London: Messrs. Charles Griffin & Co., Ltd. Price 8/6.

THE volume under review is the eleventh edition of this very useful compendium of rules and tables. It is now about twenty years since the first edition of this work was published, and it is recognised that much advance has been made in marine engineering in this period. However, the popularity of this handbook has been so marked that in its twenty years the eleventh edition is published. This frequency of republication is a very important one as it enables the work to be kept well up-to-date and thus include the results of the latest experience. The new edition contains a few corrections and rearrangements of the subject matter and the regulations of the registration societies are brought up-to-date. Particular attention may be drawn to the alteration in the rules of the British Corporation, to the complete recasting of those of the Bureau Veritas and to changes in Lloyd's rules relating to refrigerating machinery. Among the variations in engine practice may be mentioned slight alterations in cylinder rating, so as to conform to the most recent practice. The general get up of the book is quite in consonance with its well-known appearance in the past.

AUSTRALASIAN INSTITUTE OF MARINE ENGINEERS.—It is with regret we have heard of the severe illness of Mr. T. G. Johnson, the secretary of the Brisbane branch of the Australasian Institute of Marine Engineers. He has been granted leave of absence for twelve months and the members are hoping, in sympathetic recognition of his services, to raise £1000 to present to him with a view to enable him to take full advantage of an extended holiday to recruit his health. We join in the hope that he may be quite restored to re-enter upon his duties.

LAUNCHES AND TRIAL TRIPS.

LAUNCHES—English.

Eloby.—On September 12th, Messrs. Irvine's Shipbuilding and Dry Docks Co., Ltd., launched from their Middleton Shipyard, the handsome steel screw steamer *Eloby*, built for Messrs. Elder Dempster & Co., of London and Liverpool, the vessel being intended for trading on the West African Coast. The dimensions of the vessel are: Length, 420 ft.; beam, 54 ft.; depth, 36 ft. 3 in., with complete main, upper and shelter decks and poop, bridge and forecastle above the shelter deck. She is classed Lloyd's 100 A1, and is built with channel frames and channel beams, which, with a combination of wide-spaced hold pillars and girders, gives clear holds and a maximum of capacity. Cellular double bottom is fitted all fore and aft, having a centre water-tight division with fore and after peaks for water ballast. The loading and discharging appliances are of the most up-to-date description, consisting of fifteen powerful steam winches, sixteen Mannesmann tube derricks and one special derrick capable of dealing with lifts of 50 tons. The vessel is also fitted with a combined steam and hand-steering gear direct on the rudder head, with telemotor attachment amidships, patent direct steam windlass, stockless anchors, two lifeboats and six surf boats of special design for handling cargo on the coast, and a complete installation of electric light fitted, including signal lamps, binnacles and cargo clusters at each hatch. Elaborate accommodation for a number of first and second-class passengers is fitted amidships in specially designed state-rooms, together with large dining saloon, smoke-room, baths, lavatories, etc. One of the special features is the electric heating throughout, which, together with electric fans, which are fitted to each berth, and mushroom and torpedo ventilators, should greatly add to the comfort of the passengers, even in the tropical climate in which the vessel is intended to trade. The captain, officers, engineers, etc., are also berthed amidships in spacious rooms, the seamen being berthed in the forecastle and the firemen, greasers, etc., in the poop. A complete installation of refrigerating machinery is fitted on board, with large insulated rooms for passengers, provisions, etc. The machinery, which has been constructed by Messrs. Richardsons, Westgarth & Co., Ltd., Hartlepool, consists of a set of triple-expansion engines with cylinders 26 in., 44 in. and 74 in. diameter by 51 in. stroke, and three large boilers working under forced draught at a pressure of 205 lbs. per square inch. The design throughout has been very carefully considered with a view to obtaining the best possible results in ordinary work at sea, and the specification embodied the latest improvements in marine engine practice. Both the main and auxiliary condensers are of the "Contraflo" type and the "Contraflo" system has been adopted in its entirety. The whole of the auxiliaries exhaust into an oil separating surface-feed heater, the water of condensation being led into a cascade filter tank, and any surplus steam is automatically discharged to the cascade or to the auxiliary condenser as required. Both the main and auxiliary condensers are provided with separate centrifugal circulating pumps. The main feed pumps are of the slow speed independent type and a general service pump is also installed of similar design; other auxiliaries include large vertical duplex ballast pump, sanitary and wash deck pumps and a Morison's evaporator with automatic feed water control. The propeller is of the built type, the boss being of cast steel and the blades of manganese bronze.

Withernsea. On September 12th, Earle's Shipbuilding and Engineering Co., Ltd., launched from their yard the handsomely modelled single-screw steamer *Withernsea*, built to the order of Messrs. The Sea Steamship Co., Ltd., Hull, for their general trade. The principal dimensions are: Length, 352 ft.; breadth, 49 ft. 6 in. moulded; depth, 24 ft. 3 in. moulded. She has been constructed of steel to Lloyd's 100 A1 class (single-deck rule) to the Board of Trade latest requirements, including grain certificate, also to French, Italian and Suez Canal certificates, and is designed for carrying a large quantity of water ballast in the cellular double bottom and peak tanks. A deckhouse has been provided amidships for the accommodation of captain, officers and stewards, having a combined chart-room and wheelhouse overhead. The engineers are berthed in side houses abreast the engine casing, and the petty officers, seamen and firemen under the forecastle deck. The vessel will be fitted with two steel masts, having telescopic wood pole for Manchester Ship Canal requirements, three steel derrick posts, each complete with wood derricks and all necessary cargo gear for rapid loading and discharging. There are eight powerful steam winches, patent direct acting steam windlass and steam and hand-steering gear. The machinery consists of a set of triple-expansion engines, having cylinders 24 in., 39 in. and 66 in. diameter by 45 in. stroke, steam being supplied by three single-ended cylindrical boilers working at a pressure of 180 lbs. per square inch. The ship and machinery have been constructed under the superintendence of Mr. T. H. Jenkin (Messrs. Jamieson & Co.).

Natica.—On September 13th, another oil tank steamer was launched for the Anglo-Saxon Petroleum Company, Ltd., of London, being the fifth that Messrs. Swan, Hunter & Wigham Richardson, Ltd., of Wallsend, have built for these owners. The overall dimensions of the *Natica* are 418 feet long, 51½ feet broad, and 31 feet deep. The Wallsend Slipway and Engineering Company, Ltd., are constructing the boilers and engines, which will be placed in the extreme after end of the ship. The boilers are to be fitted with oil-burning installation designed by Mr. R. A. Mever, the owners' advisory engineer. The forward hold of the ship is designed to carry general cargo, but all the others will take petroleum or benzine in bulk. There is a cofferdam at each end of the range of these oil carrying compartments.

Luneda. On September 14th, there was launched from the yard of Messrs. Cochrane & Sons, Selby, a steel screw trawler, the principal dimensions being 130 ft. by 23 ft. by

13 ft. 6 in. moulded. The vessel has been built to the order of Messrs. The Lancashire Steam Carrying Co., Ltd., Fleetwood, and will be complete with all the latest improvements for the coasting trade. She will be fitted with powerful triple expansion engines by Messrs. C. D. Holmes & Co., Ltd., Hull.

Ledoris.—On September 14th, there was launched from the yard of Messrs. Cochrane & Sons, Selby, a steam tug, the principal dimensions being 84 ft. by 17 ft. by 10 ft. moulded. The vessel has been built to the order of Mr. J. Constant, of London, and will be fitted with compound surface-condensing engines by Messrs. Earle's Shipbuilding and Engineering Co., Ltd., Hull.

Laertis.—There has been launched on the Wear a first class cargo steamer built to the order of Mr. G. C. Dracoulis, Braila. The principal dimensions are:—Length, 390 ft., breadth, 51 ft. 3 in.; and depth, 25 ft. 3 in. She is constructed with single deck and long bridge, and will take Lloyd's highest class. She will have triple-expansion engines with cylinders 25 in., 42 in. and 68 in., with a stroke of 45 in.

Treglisson.—On September 23rd, there was launched from the shipbuilding yard of Messrs. John Readhead & Sons, Ltd., West Docks, South Shields, a steel screw steamer, built to the order of Messrs. Edward Ham & Sons, St. Ives, Cornwall, and named the *Treglisson*. The dimensions of the vessel are 381 ft. by 51 ft. by 27 ft. 8½ in., and she carries a deadweight cargo of 7,650 tons on a light draught of water. She is of the improved single deck type, to Lloyd's highest class, and under their special survey, having poop, extra long bridge, and topgallant forecastle, with deep girder framing, and cellular double bottom fore and aft, with large after-peak tank for water ballast. The outfit of the ship is very complete for general and grain trades, with shifting boards all fore and aft, and large hatchways as feeders. A full equipment of steam winches and derricks is fitted for the rapid loading and discharging of cargoes. The vessel will be fitted with triple expansion engines, also constructed by Messrs. John Readhead & Sons, Ltd., having cylinders 26 in., 42 in. and 69 in. with 48 in. stroke, supplied with steam from two large steel boilers working at a pressure of 180 lbs. per square inch.

Burbridge.—On September 24th, Messrs. Richardson, Duck and Co., Ltd., launched from their yard a steel screw steamer of the following dimensions:—Length overall, 373 ft.; breadth extreme, 50 ft.; depth moulded, 23 ft. 10½ in.; tonnage, gross, about 3,360 tons; deadweight, about 6,140 tons. This vessel, which has been built to the order of Messrs. Burdick & Cook, of London, will class 100 A1 in Lloyd's Register, and has been built under special survey. She is of the single-deck type, and has a cargo poop, long bridge amidships with accommodation for captain, officers and engineers in steel houses on bridge deck and topgallant forecastle for crew. A cellular double bottom throughout and forward and after-peak tanks are fitted for water ballast, and equipment includes large horizontal multitubular donkey boiler, six steam winches, steam-steering gear, steam windlass with quick warping ends, stockless anchors and all modern improvements for facilitating loading and discharging. The engines, by Messrs. Blair & Co., Ltd., have cylinders 24 in., 40 in. and 66 in. by 45 in. stroke, steam being supplied by two single-ended boilers having a working pressure of 180 lbs.

Noya.—On September 25th, Messrs. Wm. Doxford & Sons, Ltd. launched from their yard at Pallion the s.s. *Noya*, built to the order of The English & American Shipping Co., Ltd., London. The dimensions of the vessel are:—Length, 385 ft.; breadth, 50 ft.; moulded depth, 28¾ ft.; deadweight capacity, 7,300 tons. During construction the vessel has been superintended by Mr. Walter Bradney and Captain E. Cox. The classification is with the British Corporation. Messrs. Wailes, Dove & Co.'s "Bitumastic" enamel has been applied throughout the double bottom bilges and bunkers.

Anglo-Egyptian.—The s.s. *Anglo-Egyptian* was successfully launched on September 25th from the shipyard of Messrs. Short Brothers, Ltd., of Pallion, Sunderland. She is built to the order of the Nitrate Producers Steamship Co., Ltd., of London (Messrs. Lawther, Latta & Co., managers), with leading dimensions of 442 ft. length, 56 ft. 4 in. beam, and 30 ft. 7½ in. depth moulded, and is designed to carry a deadweight of about 11,350 tons. The vessel is built on the Isherwood system of longitudinal framing, with shelter, upper and main decks of steel laid the entire length, and will take Lloyd's highest class. A double bottom has been fitted throughout for the carriage of oil fuel or water ballast, and the fore and after peaks are also arranged for water ballast. The holds and 'tween decks are supported by seven water tight bulkheads. The shelter deck has been fitted with four large doors through sides, so that the steamer may be readily adapted for the conveyance of horses or cattle. A dining-saloon, neatly panelled in oak, is fitted in large steel house on shelter deck, with four state rooms for passengers' accommodation, for the captain with chart-room, office and library, and another spare berth is in a house above saloon house, the officers and engineers are berthed in house abreast of engine casing on shelter deck, and the crew and petty officers in the after end of shelter-deck. The accommodation throughout has been specially designed to give the greatest possible comfort to officers and crew. Smoke room and mess room are provided for officers and engineers, and a very complete sanitary service is installed, including baths for crew, officers, engineers, and for the captain and passengers. Electric light is arranged throughout accommodation in engine-room and tunnel, with large clusters over each hatch way. The cargo arrangements are very complete, sixteen derricks being fitted on tables and masts, and, in addition, an arrangement of Porter's patent derrick gear to lift 20 tons will be available at each mast, the masts being strengthened to carry this weight. Two derricks to work the cross bunker hatch are placed on strengthened posts, the posts being utilized for ventilation of stokehold. Ten steam winches, two with extended ends, and the after-winch fitted with gipsy wheel, clutch and brake for steam cable, steam windlass, steam-steering gear amidships controlled by rods from standard flying bridge and connected by chains and rods to powerful four-armed quadrant on rudder head. Crompton's self-tipping ash hoist with shoot over side and fresh-water distiller will be supplied, taking steam from a multitubular boiler of 120 lbs. pressure placed in stokehold and exhausting to a "Contraflo" winch condenser in discharge recess. Hand-steering gear with two wheels and Lyall's patent rudder brake are also fitted. Clayton's fire-extinguishing system is installed to all compartments. Propelling machinery will be fitted by the North-Eastern Marine Engineering Co., Ltd., Wallsend, and consists of quadruple engines with cylinders 25½ in., 36½ in., 52½ in. and 76 in. in diameter, and a stroke of 51 inches, driven from three large boilers of 220 lbs. pressure with Howden's forced draught. The machinery has been designed throughout with a view to economical working, being considerably strengthened above the usual practice with extra large bearing surfaces at all working parts. The main condenser is of the Contraflo type (Morrison's patent).

Newfield.—On September 26th, Messrs. Irvine's Shipbuilding and Dry Docks Co., Ltd., launched from their Harbour Dockyard, West Hartlepool, the steel screw steamer *Newfield*, built to the order of Messrs. J. J. & C. M. Forster, Newcastle-on-Tyne. The dimensions of the vessel are:—302 ft. in length by 51 ft. 0½ in. beam extreme by 26 ft. 3 in. depth moulded, having a deadweight carrying capacity of about 6,600 tons. She is of the single-deck type, with poop, bridge and forecastle, and is built to Lloyd's highest class; cellular double bottom is fitted throughout, and large fore and after peaks for water ballast. The vessel is constructed with deep frames without side stringers, giving clear holds for the storage of bulky cargoes, and is divided into seven watertight compartments by means of six bulkheads. Wood grain divisions are fitted throughout the holds to Board of Trade requirements. Four large hatches are provided with nine powerful steam winches worked from a multitubular donkey boiler, and all the latest improvements are included for the rapid loading and discharging of cargo. A powerful quick-warping steam windlass is fitted forward, and steam-steering gear amidships with hand-screw gear aft. Accommodation for the captain, officers and engineers is arranged amidships, fitted with steam heating, the crew and firemen being berthed in the forecastle. The lighting, ventilating and sanitary arrangements have received special attention, the most improved methods being adopted throughout. Triple-expansion engines will be supplied and fitted by Messrs. Richardsons, Westgarth & Co., Ltd., Hartlepool, having cylinders 25 in., 40 in. and 67 in. by 45 in., with two large single-ended boilers working at a pressure of 180 lbs. per square inch. The donkey boiler is also arranged for the

same working pressure, and is connected up to the main engines.

Clan MacArthur.—On September 26th, there was launched at Walker-on-Tyne, a large steel screw steamer, built to the order of Messrs. Cayzer, Irvine & Co., Ltd., Glasgow, for the Clan Line. The principal dimensions of the vessel are:—Length, 465 ft.; breadth, 57 ft.; and depth moulded, 37 ft. 1 in., with a deadweight carrying capacity of 8,850 tons. The cellular double bottom and the forward and after peaks are fitted for water ballast, and No. 3 lower hold and ships can be arranged as a deep ballast tank when required. Nos. 1 and 4 lower holds and 'tween decks are insulated for carrying frozen meat, fruit or produce. The saloon and officers' rooms are arranged in a large deck house, and the captain's rooms are built above the saloon house. The flying bridge, on which are the chart room and steering shelter, is placed on top of the captain's house. The vessel is fitted throughout with electric light and a powerful search light is installed forward. The propelling machinery is of the triple-expansion type, manufactured by the Wallsend Slipway and Engineering Co., Ltd., having cylinders 31½ in., 52 in. and 86 in., by 60 in. stroke, steam being supplied by four boilers, 16 ft. 4 in. diameter by 11 ft. 9 in. long, working at a pressure of 220 lbs. The vessel will take the classification of the British Corporation. Messrs. Wailes, Dove & Co.'s "Bitumastic" enamel has been applied throughout all the bunkers.

Arakan.—On September 27th, Messrs. William Gray & Co., Ltd., launched the handsome steel screw steamer *Arakan*, which they have built for The Rotterdamsche Lloyd Steamship Company, Rotterdam. The vessel will take the highest class in Lloyd's Register, and is of the following dimensions, *viz.*:—Length overall, 412 ft. 6 in.; breadth, 53 ft. 6 in., and depth, 29 ft. 7½ in. She is a handsomely modelled vessel of the double-deck type with poop, extra long bridge and topgallant forecastle. The saloon, state-rooms, captain's, officers' and engineers' rooms, etc., will be fitted up in houses on the bridge deck, and the crew are berthed in the forecastle. The vessel has a cellular double bottom and after-peak tank for water ballast, and, in addition, there is a deep tank or hold compartment fitted for water ballast abaft the engine-room, giving a total capacity for water ballast of about 2,200 tons. The whole of the outfit, including steam windlass, steam steering gear, heavy derrick to lift 30 tons, thirteen steam winches with return exhaust to winch condenser of the Contraflo type, are of the most approved description. The machinery is made by the Central Marine Engine Works of the builders, being of triple-expansion type, with cylinders 28 in., 46 in. and 77 in. diameter, with a piston stroke of 48 in. She is fitted with a Contraflo main condenser, Weir's feed pumps and heater, and four large steel multitubular boilers working by Howden's system of forced draught at a pressure of 180 lbs. per square inch.

Ægir.—On September 28th, there was launched from the yard of Messrs. Cochrane & Sons, Selby, a steel screw steamer the principal dimensions being 110 ft. by 23 ft. 6 in. by 9 ft. 3 in. moulded. The vessel will be fitted with compound surface-condensing engines by Messrs. C. D. Holmes & Co., Ltd., of Hull. As the vessel left the ways she was gracefully christened *Ægir* by Miss Lucy Hutchinson, of Hull. This boat has been fitted with Vickers' patent stern tube appliance.

Sturton.—On September 30th, Messrs. Ropner & Sons, Ltd., Stockton-on-Tees, launched from their shipbuilding yard a steel screw steamer of the following dimensions, *viz.*:—Length, 398 ft. 3 in.; breadth, 52 ft.; depth, 28 ft. The vessel will be classed 100 A1 at Lloyd's, having main deck, poop, long bridge, and topgallant forecastle. Accommodation for captain, officers and engineers in houses on bridge deck, crew in the forecastle. The vessel has double bottom for water ballast on the cellular principle, and in the after-peak. She will be fully equipped with an up-to-date outfit, including quick-warping windlass, stockless anchors, steam steering gear amidships, and powerful screw gear aft. The appliances for loading and discharging cargoes expeditiously are very complete, and include ten steam winches, double derricks at each hatch, steam being supplied by a large donkey boiler, working at 100 lbs. pressure per square inch. The engines will be of the triple-expansion type by Messrs. Blair and Co., Ltd., Stockton-on-Tees, of about 2,000 I.H.P., having two steel boilers 17 ft. 6 in. by 11 ft. 6 in., 180 lbs. pressure of steam. The vessel has been built to the order of Messrs. Steel, Young & Co., of London, under the supervision of Mr. W. Ormiston, marine surveyor, of London. Messrs. Wailes, Dove & Co.'s "Bitumastic" enamel has been applied throughout the engine and boiler room tanks, boiler space and bunkers.

Denise. On October 1st, Messrs. Osbourne, Graham & Co. launched from their yard at Hylton the steel screw steamer *Denise*, which is the fifth vessel they have specially constructed to the order of Fernand Bouet, Esq., of Caen, and is a sister ship to the s.s. *Marcelle*, which was recently sent to sea. The vessel is a single decker, 270 ft. by 30 ft. 6 in., built to carry 2,400 tons on a very shallow draught, and is of the self trimming collier type. Arrangements are made for a large amount of water ballast. Rooms for the captain and officers are tastefully fitted out in hardwood and are of large size. The vessel is fitted with the most modern appliances for economical and quick working of cargo. She has been constructed to Lloyd's highest class and also complies with the requirements of the French Law. Machinery has been supplied by the North-Eastern Marine Engineering Co., Ltd., Sunderland, to drive the vessel a speed of 10 knots loaded.

Harmatris. — On October 2nd, the fine steel screw steamer *Harmatris*, was launched from the yard of The Northumberland Shipbuilding Co., Ltd., Howdon-on-Tyne, for Messrs. J. & C. Harrison, Ltd., of London. The vessel is 425 ft. in length and 52 ft. beam, with three complete steel decks, including the shelter-deck all fore and aft, with a cargo-carrying capacity of over 8,800 tons. The vessel is constructed in the most up-to-date manner, *viz.*, on the deep bulb angle frame principle, has clear holds and is fitted with the latest improvements and appliances to make her in every way a first-class liner. A large quantity of water ballast is carried in the cellular double bottom deep tank and after-peak. The shelter 'tween deck is of exceptional height, and is so arranged that a large number of emigrants, troops or horses can be carried. The loading and discharging facilities are complete, the steamer having eleven derricks and eleven winches to ensure the most expeditious handling of cargo. An electric light installation will be fitted throughout the vessel. She has been constructed to a fine model with a view to rapid speed and economy in fuel, and the machinery will be supplied by Messrs. Earle's Shipbuilding and Engineering Co., Ltd., of Hull, consisting of engines with cylinders 28 in., 46½ in., 78 in. by 54 in., three boilers 15 ft. 3 in. by 12 ft., 200 lbs. pressure, constructed to the requirements of the Hamburg Baupolizei, and fitted with Howden's forced draught. During construction the vessel has been superintended by Mr. W. Grandell and Mr. J. White. Messrs. Wailes, Dove & Co.'s "Bitumastic" enamel has been applied throughout the engine-room tank, deep tank, bunkers, etc., and their patent "Bitumastic" covering to the tank tops.

Tasman.—On October 9th, Messrs. Earle's Shipbuilding and Engineering Co., Ltd., launched from their yard a finely-modelled single-screw steamer, built to the order of the Koninklijke Paketvaart Maatschappij, Amsterdam. The vessel, which was named *Tasman*, is intended for the passenger and general service between Java and Australia, and has been built under the supervision of Mr. M. A. Cornelissen, of Amsterdam, and Mr. J. Shekter, as resident inspector. The principal dimensions are:—Length, 392 ft.; breadth moulded, 40 ft. 6 in.; depth moulded, 28 ft. 9 in. She is constructed of steel to Bureau Veritas Class* I. 3/3 L., and is arranged to carry a large quantity of water ballast in the cellular double bottom and in peak tanks. The vessel is of the full-deck type, with boat, promenade, shade and forecastle decks. The passenger accommodation is on an elaborate scale, and a special feature is the system of ventilation. In the after upper 'tween decks a system of insulated cooling and freezing rooms is installed for preserving meat, fish, fruit, vegetables, etc., fitted up with brine pipes served from the refrigerating machines in the engine room. An ice-tank is also provided capable of making a considerable quantity per day, with the necessary gear for lifting the ice moulds. On this deck several large rooms are arranged for storing provisions, and a system of filter tanks with water coolers is arranged for supplying fresh water for drinking purposes to various parts of the vessel. In the holds an extensive fire-extinguishing apparatus is fitted, being supplied with steam from the boilers in case of fire amongst the cargo.

A complete installation of electric lights and bells will be fitted in all compartments throughout the vessel. The vessel will be provided with wireless telegraph apparatus, a Marconi station being established on the boat-deck, including rooms for operators, and a waiting room for passengers, these having all the special features of the latest type of Marconi stations. The steam steering gear is the Wilson-Pirrie combined type with telemotor control, having hand gear worked from boat deck aft, and patent spring quadrant and rud ler brake, also an electric tell tale placed on navigating bridge and connected to the after steering station. Welin's patent quadrant davits are adopted, enabling the boats to be launched promptly, and the boat accommodation is ample for all persons on board the vessel. There are eleven powerful steam winches for working the cargo, and a patent direct acting steam windlass, all of special design and make. The propelling machinery will consist of a set of triple-expansion inverted cylinder engines, having cylinders 20½ in., 48½ in. and 80 in. diameter by 54 in. stroke, steam being supplied by four large cylindrical boilers working at a pressure of 180 lbs. per square inch, and fitted with Howden's system of forced draught. Separate centrifugal pumps, feed pumps, sanitary pumps, fresh-water pumps, evaporator, refrigerating machinery and two large dynamos will be fitted in the engine room. The engines are of the highest class, economy in working being carefully considered throughout the design. The whole of the machinery work has been carried out under the supervision of Mr. A. C. Metzelaar, of the Koninklijke Paketvaart Maatschappij, and Mr. P. J. Muchall, as resident inspector.

Capbreton. On October 10th, there was launched from the yard of Messrs. Smith's Dock Co., Ltd., South Bank-on-Tees, a finely modelled steel screw steamer, built to the order of Messrs. Plisson & Cie., of Paris, Bayonne and Cardiff. The dimensions of the vessel are: Length, 247 ft.; breadth, 38 ft., and moulded depth, 19 ft. 4 in. The vessel has a carrying capacity of 2,500 tons on a shallow draught of 17 ft. She has three holds, with four large hatchways for the rapid handling of coal cargoes, and is fitted with double-bottom throughout, a dry tank being arranged underneath the main boilers. The whole of the internal surfaces have been coated with Messrs. Wailes, Dove & Co.'s "Bitumastic" enamel. The deck machinery comprises double derricks fitted to tables on the masts, with five steam winches driven by a large donkey boiler, for the rapid discharging of cargo. The propelling machinery consists of triple-expansion engines, having cylinders 19 in., 31 in. and 52 in. diameter with a stroke of 36 in., and two extra large main boilers with six furnaces, capable of driving the vessel at a good speed on a moderate consumption of coal. The engines have been built to a very high-class specification. The vessel has been built to the British Corporation Survey.

Mokta.—On October 11th, Messrs. William Gray & Co., Ltd., launched the handsome steel screw steamer *Mokta*, which they have built to the order of Messrs. Frank C. Strick and Co., Ltd., of London and Swansea, for La Tunisienne Steam Navigation Co., of Paris. She will take the highest class in Lloyd's Register, and is of the following dimensions:—Length overall, 362 ft.; breadth, 50 ft., and depth, 27 ft. 8 in., with long bridge, poop and topgallant forecastle. The saloon, state-rooms, captain's and officers' rooms will be fitted up in the poop, and the engineers' in houses on the bridge deck, and the crew's berths in the forecastle. An electric light installation is being fitted throughout. The hull is built with deep bulb-angle frames, cellular double bottom and large aft-peak ballast tank, ten steam winches, steam-steering gear amidships, hand-screw gear aft, patent direct steam windlass, large horizontal multitubular donkey boiler, stockless anchors, telescopic masts with fore and aft rig, boats on deck overhead, and all requirements for a first-class cargo steamer, including Porter's patent derrick sockets for dealing with heavy lifts by combining the ship's ordinary derricks. Triple-expansion engines are being supplied by the Central Marine Engine Works of the builders, having cylinders 23 in., 38 in. and 64 in. diameter, with a piston stroke of 42 in., and two large steel boilers adapted for a pressure of 180 lbs. per square inch, worked under Howden's system of forced draught.

Caulonia.—On October 12th, there was launched from the yard of Messrs. Cochrane & Sons, Selby, a steel screw trawler, the principal dimensions being 136 ft. 8 in. by 23 ft. by 13 ft. moulded. The vessel has been built to the order of The Grimsby Alliance Steam Fishing Co., Ltd., Grimsby, and will be replete with all the latest improvements for the fishing trade. She will be fitted with powerful triple expansion engines by Messrs. C. D. Holmes & Co., Ltd., of Hull.

LAUNCHES—Scotch.

City of Dunkirk. On September 25th there was launched at Whitemch the single screw steamer *City of Dunkirk*, which has been built for the Ellerman Line's general cargo trade. The vessel is 431 ft. in length, 54 ft. 3 in. in breadth, 32 ft. 7 in. in depth, and of about 6,000 tons gross. She will be fitted with triple-expansion engines having cylinders 24¾ in., 42¾ in. and 74 in. in diameter, with a stroke of 48 in., supplied by steam from two single-ended boilers. The vessel is built to the highest class of the British Corporation.

Alarm. On September 26th, Messrs. Hawthorns & Co., Ltd., launched from their Junction Bridge Works a light vessel named *Alarm*, to the order of the Mersey Docks and Harbour Board. The dimensions of the vessel are as follows: Length b.p., 104 ft.; breadth moulded, 24 ft.; depth moulded, 15 ft. This vessel is built of steel and iron, and of very strong construction, as she will be moored in an exposed position. During the building, the work was under the superintendence of Mr. F. W. Mace, marine surveyor to the Dock Board. She will be fitted with a light of the latest construction, and a powerful fog horn and all the latest requirements for such a vessel. This is the second lightship recently built by the firm, as they have just delivered at Kingstown, Ireland, one of the same size to the order of the Irish Lights Commissioners.

Posillipo. On September 28th, there was launched from the shipbuilding yard of Messrs. David & William Henderson and Co., Ltd., Partick, a large steel screw steamer which they have built to the order of Messrs. Peirce Bros., Naples. The vessel, which is 395 ft. long by 53 ft. broad by 28 ft. 3 in. moulded depth, is classed in Lloyd's 100 A1 shelter deck class, and about 5,000 tons gross. She is rigged as a two masted schooner and has an exceptionally large number of derricks which, with seventeen steam winches, provide ample and efficient means for the rapid handling of large cargoes. Comfortable accommodation is provided on the shelter deck amidships for passengers, officers and engineers, while the petty officers and crew are berthed in houses on the shelter deck. The machinery, which has been constructed by the builders, consists of triple-expansion engines having cylinders 26 in., 43 in. and 71 in. diameter by 48 in. stroke, steam being supplied from four boilers working at a pressure of 200 lbs.

Saint Ursula. On September 28th, Messrs. Russell & Co., Port Glasgow, launched the steamer *Saint Ursula*, which they have built for Messrs. Rankin, Gilmour & Co., Liverpool. The vessel is 405 ft. in length, 52 ft. 3 in. in breadth, 30 ft. in depth, and of about 4,900 tons gross. She is constructed to the highest class at Lloyd's, and is fitted with all the most approved requirements for a present day type of cargo steamer. The engines, which are being supplied by Messrs. Rankin and Blackmore, Greenock, have cylinders 27 in., 44 in. and 73 in. in diameter respectively, and a stroke of 48 in.

Itapuhy.—The Ailsa Shipbuilding Co., Troon, recently launched the twin-screw passenger and cargo steamer *Itapuhy*, which they have built to the order of Messrs. John M. Campbell & Son, Glasgow, for foreign owners. The *Itapuhy* is the fourth of five sister-ships built and building by the Ailsa Company for the same owners. The dimensions of the vessel are:—Length between perpendiculars, 288 ft.; breadth, 43 ft. and depth, 18 ft. 9 in. The machinery, which will be supplied by the builders, consists of two sets of triple-expansion engines designed to give a speed of 12 knots.

Salerno.—Messrs. Dunlop, Bremner & Co., Ltd., Port Glasgow, launched recently the single-screw steamer *Salerno*, which they have built for the Wilson's Line general cargo trade. Her dimensions are:—Length, 300 ft.; breadth, 44 ft. 6 in.; depth, 20 ft. 3 in.; and 2,100 tons gross. The vessel will be supplied with triple-expansion engines by the builders.

Woolwich.—Recently Messrs. Harland & Wolff, Govan, launched a depot and repair ship, named *Woolwich*, for the British Admiralty. The *Woolwich* is a vessel of 3,000 tons gross, and she has a length of 320 ft., a breadth of 40 ft., and a depth of 21 ft. She will be supplied with engines to operate

twin screws. She will contain machinery for executing repairs, and will carry storage and ammunition for the use of destroyers. There was no ceremony at the launch. The vessel was afterwards towed to the firm's fitting-out basin.

New Steamer.—The Dundee Shipbuilding Co. recently launched a steamer which they have built to the order of Messrs. M. A. Ray & Sons, London. The vessel is about 200 ft. in length, and 30 ft. in breadth, and she is designed to carry 1,000 tons deadweight on a light draught.

Dunachton.—Messrs. Charles Connell & Co., Whiteinch, recently launched the steel screw steamer *Dunachton*, which they have built for the Dunedin Steamship Co., Leith. The vessel has been constructed to Lloyd's highest class, and is of about 5,000 tons gross. Triple-expansion engines will be supplied by Messrs. Dunsmuir & Jackson, Govan.

Bernicia.—Messrs. Ramage & Ferguson, Leith, recently launched a passenger and cargo steamer which they have built for the Leith and Newcastle trade of the Leith, Hull and Hamburg Steam Packet Co. (Messrs. James Currie & Co., managers). The vessel is to take the place of another of the same name, the *Bernicia*, which was sold last year to take up a mail service in the Mediterranean. The principal dimensions of the new vessel are :—Length, 220 ft. 6 in. ; breadth moulded, 32 ft., and depth moulded to main deck, 13 ft. 6 in. The vessel will be supplied with triple-expansion engines, with cylinders of 19 in., 31 in. and 51 in. in diameter respectively, and a 36-in. stroke. Accommodation is provided for about 300 cabin passengers and about 260 steerage passengers. The vessel is the seventeenth sea-going steamer built by Messrs. Ramage & Ferguson for the same owners.

Eibergen.—The Greenock and Grangemouth Dockyard Co., Grangemouth, recently launched a steel well-deck steamer named *Eibergen*, which they have built for the Furness Shipping and Agency Co., Rotterdam. The dimensions of the vessel are :—Length, 280 ft. ; breadth, 40 ft. 6 in. ; depth, 20 ft. 6 in. moulded to main deck. She has been built to the highest class in the British Corporation and is designed to carry a deadweight of 3,250 tons. Machinery will be supplied by Messrs. Richardsons, Westgarth & Co., Middlesbrough.

Infanta Isabel de Bourbon.—On September 28th, Messrs. William Denny and Brothers, Dumbarton, launched the "combination" triple-screw steamer *Infanta Isabel de Borbon*, which they have built for the Compania Transatlantica, Barcelona. The vessel has been designed for the high-class passenger trade which the Company carries on between the south of Europe and South America. She is 480 ft. in length between perpendiculars, 61 ft. in breadth moulded, and 35 ft. 9 in. in depth moulded. She has been built to the requirements of Lloyd's Register, the British Corporation, and the Registro Nazionale Italiano, and she also conforms to the regulations of the Board of Trade and the Italian Government for the transport of emigrants. Special strengthening has been fitted in the hull so that guns may be mounted and the ship may be used as an armed cruiser in time of war. The propelling machinery will consist of two sets of triple-expansion engines and an exhaust turbine, a combination first adopted on the *Otaki*, built by Messrs. Denny in 1908, and followed since with success in a number of large steamers. The whole of the propelling machinery is being made by Messrs. Denny & Co., Dumbarton. Messrs. Wailes, Dove and Co.'s "Bitumastic" solution enamel has been applied throughout the engine and boiler-room tanks, double bottom ballast tanks, and their patent "Bitumastic" covering to the tank tops. All the special side lights and the whole of the windows have been supplied by Messrs. J. Stone & Co., Ltd., of Deptford, London, and special attention has been given to the question of ventilation of the cabins and saloons by means of these lights. The water-tight doors are hydraulically controlled by the "Stone-Lloyd" system, thus rendering the vessel practically unsinkable. The propellers for both the turbine and reciprocating engines have been manufactured of Stone's bronze.

Baron Vernon.—On October 10th, Messrs. Archd. McMillan and Son, Ltd., Dumbarton, launched the steamer *Baron Vernon*, which they have built to the order of Messrs. H. Hogarth & Sons, Glasgow. The vessel, which is of the shelter-deck type with forecastle forward, is of the following dimensions, *viz.* :—Length between perpendiculars, 285 ft. ; breadth moulded, 42 ft. 6 in. ; depth moulded to shelter deck, 27 ft. Accommodation for captain, officers and engineers is provided in houses on top of shelter-deck amidships, while the crew are berthed forward. The machinery will be supplied by Messrs. Dunsmuir & Jackson, Govan, and both vessel and machinery have been built under the special survey of the British Corporation for their highest class. During construction the steamer has been under the supervision of Mr. Hutchison and Mr. Robertson, the owners' representatives.

Curzon.—On October 12th, there was launched the turbine steamer *Curzon*, which Messrs. A. & J. Inglis, Pointhouse, have built for the South Indian Railway Co. The *Curzon* is the first of three sister ships which Messrs. Inglis are building. The steamers have a length over all of about 260 ft., a breadth of 38 ft., and a depth to the promenade deck of nearly 19 ft., and their gross tonnage will be rather less than 700. The propelling machinery will consist of two sets of geared turbines of the latest Parsons type, one high-pressure and one low pressure being coupled to each of the two shafts by means of machine-cut gears, each shaft driving one of the twin-screws. This gearing has been made by the Parsons Marine Steam Turbine Co., to the order of Messrs. Inglis. The boilers are of the Yarrow type, and have been constructed by Messrs. Yarrow to the order of the contractors for the vessels. Arrangements will be made for burning either Indian coal or oil fuel, as may be decided later.

Saxon Monarch.—On October 12th, there was launched by Messrs. Napier & Miller, Ltd., Old Kilpatrick, the steel screw steamer *Saxon Monarch*, which they have built to the order of the Monarch Steamship Co. Ltd. (Messrs. Racburn and Verel, Ltd., managers). The vessel has been built to the highest class under the British Corporation rules. The principal dimensions are—length b.p. 420 ft., breadth moulded 53 ft., depth moulded 36 ft. with a gross tonnage of about 6,000 tons, and carrying capacity of fully 9,000 tons. She has complete shelter and upper decks, water ballast in cellular double bottom aft peak and large deep tank abaft engine-room. The vessel has a most complete and convenient arrangement of hatches, derricks and ten steam winches for the rapid handling of cargo, electric light is fitted throughout. The machinery, which is being supplied by Messrs. David Rowan & Co., Glasgow, consists of triple-expansion engines with cylinders 27 in., 44 in., 73 in. respectively, by 48 in. stroke. There are two boilers of large size fitted with Howden's forced draught, also donkey boiler.

Sanwarine.—On October 12th, the Clyde Shipbuilding and Engineering Co., Ltd., Port Glasgow, launched a steel screw steamer; 280 ft. by 42 ft. by 27 ft. to shelter deck, for Messrs. R. F. Sanderson & Co., Manchester. The vessel was named *Sanwarine* by Mrs. Sanderson, and immediately after the launch was placed in the Company's dock to receive her machinery, which has also been constructed by the builders. The vessel and her machinery are being constructed throughout under British Corporation survey, for their highest class.

LAUNCHES—Irish.

Hawkes Bay.—On September 27th, Messrs. Workman, Clark & Co., Ltd., Belfast, launched from their North Yard the twin-screw steamer *Hawkes Bay*, built for the Tyser Line, Ltd., London. The *Hawkes Bay* is 486 feet in length, with a gross tonnage of over 10,600, and has been constructed under special survey for the highest class in Lloyd's Register of Shipping. The owners of this vessel have made a speciality of the carriage of frozen meat, and the *Hawkes Bay* has been specially constructed for this service, three of the five holds being insulated and an installation of refrigerating machinery provided. Accommodation is provided in rooms for about 750 steerage passengers, with a large dining saloon, capable of accommodating all the passengers at one sitting ; also a comfortable smoke-room and lounge. The captain's rooms are on the bridge deck, while the officers and engineers are berthed in a deckhouse amidships. The vessel will be propelled by two sets of triple-expansion engines, having a full complement of auxiliaries supplied with steam from four single-ended steel boilers working under forced draught.

Appam.—On October 10th, Messrs. Harland & Wolff, Ltd., Belfast, launched the twin-screw passenger steamer *Appam*, built to the order of the British and African Steam Navigation Company, Ltd., Liverpool (Messrs. Elder, Dempster & Co., Ltd., managers). The new vessel is 425 feet long between perpendiculars, and 57 feet beam, with a gross tonnage of about 8,000. The vessel is built on the latest principle of

watertight construction, with double bottom extending right fore and aft. She has five steel decks, and will have sumptuous accommodation for a large number of first and second class passengers, also for a number of third class, the state-rooms being large and airy, and the public rooms exceptionally fine, the dining saloons extending the full breadth of the vessel, and the lounge and smoke-rooms are situated in the best parts of the ship. The arrangements for working ship and cargo are of the latest and most approved type, and the vessel will have a wireless telegraph installation. There will be a complete installation of electric light, and the propelling machinery consists of two sets of four-cylinder quadruple-expansion balanced reciprocating engines, also constructed by the builders of the vessel.

FOREIGN LAUNCH.

Motor Tank Ship "Juno."—In the early part of October the launch took place from the slipway of the Netherlands Shipbuilding Co., Amsterdam, of the motor tank ship *Juno*, built for the Netherlands-Indies Tank Steamboat Co., of the Hague. She is to carry 2,450 tons of benzine or kerosene, 120 tons of bunker oil, 30 tons of drinking water and 75 tons of provisions—a total of 2,675 tons—on a draught of 18 ft. 6 in. The ship is built to the requirements of the highest class of Lloyd's, under special survey. She has twelve oil tanks, four coffer-dams and two fuel bunkers. She will be propelled by a Diesel motor of 1,100 i.h.p., constructed at Amsterdam. Her speed is 10½ knots. The *Juno* is equipped with an auxiliary Diesel motor and a donkey boiler for the winches and for heating with steam. She has electric light throughout.

TRIAL TRIPS.

Chincha.—On September 14th, this beautifully modelled vessel proceeded to sea for her official trial trip. She has been specially constructed to the order of Messrs. Grace Brothers & Co., Ltd., of London and New York, for their New York and Pacific Line, by Messrs. Joseph L. Thompson and Sons, Ltd., of the North Sands Shipbuilding Yard, Sunderland, and is the sixth vessel Messrs. Thompson have constructed for this firm. The principal dimensions are:—Length, 418 ft. 6 in., by breadth 52 ft. 4 in., by depth moulded 30 ft. 6 in. The vessel is built on the Isherwood system of longitudinal framing, and is of the shelter-deck type with three complete decks and a fourth deck forward, with specially high 'tween decks for the carriage of cattle, etc. Provision is made for carrying oil fuel or water ballast in the cellular double bottom, and in a large deep tank forward of the boiler room. The arrangements for dealing with cargoes are of a most elaborate description, there being eleven large winches, and twenty-one derricks of the Mannesmann tube type, one of the derricks being capable of dealing with 30-ton lifts. A complete electric lighting installation has been fitted by Messrs. The Sunderland Forge and Engineering Co., Ltd., of Pallion, Sunderland, and an installation of acetylene lighting is provided for the purpose of working cargoes and lighting the holds from the deck. The large saloon fitted amidships is of polished oak and is elaborately furnished, and the accommodation for a number of passengers and for the captain, officers and engineers is in large roomy, well-furnished rooms on the bridge. The crew and firemen are berthed aft. The propelling machinery has been constructed by Messrs. The North-Eastern Marine Engineering Co., Ltd., of Wallsend-on-Tyne, and is of the quadruple-expansion type, the size of the cylinders being 24 in., 34½ in., 49 in., 71 in. by 48 in. stroke, supplied with steam by three large boilers working at 220 lbs. pressure, with Howden's system of forced draught. At the exhaustive trial the vessel maintained a speed of over 13 knots, everything working smoothly and giving entire satisfaction to all on board.

Aurelie G.—On September 14th, the tug *Aurelie G.*, built by Messrs. George Brown & Co., Greenock, to the order and design of Messrs. John Reid & Co., Glasgow, ran her official trials and attained the satisfactory mean speed of 11 knots.

Oxfordshire.—On September 17th, the fine, large twin-screw passenger steamer *Oxfordshire*, built by Messrs. Harland & Wolff, Ltd., for the Bibby Steamship Co., Ltd., left Belfast for Liverpool after satisfactory trials. Mr. Arthur W. Bibby crossed to Liverpool in the *Oxfordshire* with a party, also Mr. Richard Hall, the Company's engineer, who has superintended the construction of the vessel and machinery at the builders' works. The vessel is in command of Captain G. H. Harris. For Launch, see July issue.

Coombar.—The new twin screw steamer *Coombar*, built by Messrs. Murdoch & Murray, Port Glasgow, for the North Coast Steam Navigation Co., Sydney, N.S.W., ran trials on the Clyde recently. For Launch, see September issue.

Strathcarron.—The new steamer *Strathcarron*, built for Messrs. Burrell & Son, Glasgow, has undergone her official speed trials. Compasses having been adjusted, the vessel proceeded down the Clyde, and on two runs between the Cloch and Cumbrae lights a mean speed of 12 knots was attained, the machinery working without a hitch and giving entire satisfaction to all interested. For Launch, see September issue.

Kenmore.—On September 17th, the steel screw steamer *Kenmore*, built at Stockton-on-Tees, to the order of Messrs. Wm. Johnston & Co., Ltd., of Liverpool, was taken to sea for her trials. The vessel attained a mean speed of 12·4 knots, and the behaviour of both ship and machinery was entirely satisfactory. The vessel then left Tees Bay on her way to Cardiff. For Launch, see September issue.

Reime.—On September 18th, Messrs. Osbourne, Graham and Co. sent to sea for her official trial the steel screw steamer *Reime*, which they have specially constructed on the "Monitor" patent system to the order of Messrs. Fearnley and Eger, of Christiania. The vessel was fully loaded and the trial resulted in her obtaining a mean speed of 9½ knots on a moderate consumption. This was very satisfactory to all concerned. For Launch, see September issue.

Willerby.—On September 18th, the s.s. *Willerby*, built by Messrs. Ropner & Sons, Ltd., of Stockton-on-Tees, made her official trial trip in the Tees Bay. After some very satisfactory trial runs, during which the vessel attained a speed of over 10½ knots, she proceeded to Baltimore, U.S.A. For Launch, see September issue.

Baharistan.—On September 19th, the handsome steel screw steamer *Baharistan*, built by Messrs. Wm. Gray & Co., Ltd., for Messrs. Frank C. Strick & Co., Ltd., of Swansea and London, was taken to sea for her trial trip. The performance of the vessel and machinery was highly satisfactory, an average speed of 11½ knots being obtained. The vessel afterwards proceeded to Glasgow to load. For Launch, see September issue.

Yorkmoor.—On September 20th, the new screw steamer *Yorkmoor*, built by Messrs. John Readhead & Sons, Ltd., West Docks, South Shields, to the order of Messrs. Walter Runciman & Co., Newcastle-on-Tyne, was taken to sea on her official trial trip. After the trial, which was in every way satisfactory to all concerned, the vessel returned to the Tyne to load for the East. For Launch, see September issue.

Nitonian.—On September 21st, the *Nitonian*, built by Messrs. R. & W. Hawthorn, Leslie & Co., Ltd., Hebburn-on-Tyne, for Messrs. Frederick Leyland & Co., Ltd., Liverpool, ran her trials off the Tyne. The *Nitonian*, which is the last of four similar vessels constructed at Hebburn for Messrs. Leyland, is 413 ft. long by 52 ft. 4½ in., and carries a dead-weight of about 9,700 tons. She has been built to Lloyd's highest class, and has a Board of Trade passenger certificate. The machinery, which is by the North-Eastern Marine Engineering Company, Ltd., Wallsend-on-Tyne, consists of quadruple-expansion engines, with cylinders 23½ in., 34 in., 49 in. and 70 in. by 51 in. stroke, steam being supplied by three large boilers working at 215 lbs. pressure. The trials were very satisfactory, and at their conclusion the ship sailed for Galveston.

Saint Andrew.—On September 26th, the new steamer *Saint Andrew*, built by Messrs. Archd. McMillan & Son, Ltd., Dumbarton, for Messrs. Rankin, Gilmour & Co., Liverpool, ran trials on the Firth of Clyde. On completion of trials, which were in every way satisfactory, the steamer left for her loading port. For Launch, see October issue.

Glace Bay.—On September 27th, the s.s. *Glace Bay*, built and engined by Messrs. Wm. Doxford & Sons, Ltd., Pallion, Sunderland, to the order of The Glace Bay S.S. Co., Ltd., London, ran a successful fully loaded sea trial, when a mean speed of 11 knots was obtained. For Launch, see September issue.

Fullerton.—On October 1st, the fine steel screw steamer *Fullerton*, built by Messrs. Sir Raylton Dixon & Co., Ltd., at their Cleveland Dockyard, Middlesbrough, to the order

of the Denaby & Cadeby Main Collieries, Ltd., of London, etc., proceeded to sea for her official trial. The trials passed off most successfully. For Launch, see September issue.

Portloe.—On October 3rd, the screw steamer *Portloe*, of Cardiff, ran a very successful trial trip. She was built by Messrs. John Blumer & Co., for Messrs. McNeil, Hinde & Co. The engines, which are by Messrs. John Dickinson & Sons, Ltd., of Sunderland, worked satisfactorily, and the owners expressed themselves as highly satisfied with the ship and her performance. For Launch, see October issue.

Arachne.—On October 5th, the handsome steel screw steamer *Arachne*, built by Messrs. Wm. Gray & Co., Ltd., for Messrs. Rickinson, Sons & Co., West Hartlepool, had her trial trip in Hartlepool Bay. The trial was entirely satisfactory, and on its completion the vessel proceeded on her voyage. For Launch, see September issue.

Maston.—On October 5th, the s.s. *Maston*, built by Messrs. Wm. Pickersgill & Sons, Ltd., Sunderland, for The Thomas and Appleton Shipping Co., Ltd., Cardiff, proceeded to sea and had a most successful trial trip. For Launch, see October issue.

Denby Grange.—On October 5th, the steel screw steamer *Denby Grange*, built by The Northumberland Shipbuilding Co., Ltd., Howdon-on-Tyne, to the order of Messrs. Furness, Withy & Co., Ltd., West Hartlepool, for the Houlder Line, left the Tyne for her trial trip. The trial trip proved satisfactory and a speed of 11 knots was obtained. After the trial trip the vessel left for Newport, Mon., to load for the River Plate, under the command of Captain H. H. Lay. For Launch, see September issue.

Confield.—On October 16th, the handsome steel screw steamer *Confield*, built by Messrs. Wm. Gray & Co., Ltd., to the order of Messrs. E. J. Sutton & Co., of Newcastle-on-Tyne, had her trial trip. On the run round to the Tyne the vessel averaged a speed of 11·1 knots, the performance of ship and machinery being highly satisfactory to all concerned. For Launch, see October issue.

Itassuce.—The new twin-screw passenger steamer *Itassuce*, built and engined by the Ailsa Shipbuilding Company, Troon, for foreign clients of Messrs. John M. Campbell & Son, Glasgow, recently ran official trials on the Firth of Clyde. The trials were satisfactory in every respect, the speed attained on the measured mile being one knot over that specified in the contract. The vessel was superintended during construction by Captain Richard Morris and the machinery by Messrs. John Crookston & Son, London. The *Itassuce* is the third of an order for five similar steamers placed by the owners with the Ailsa Company.

Maria Racich.—On October 18th, the s.s. *Maria Racich*, built and engined by Messrs. Wm. Doxford & Sons, Ltd., Pallion, Sunderland, to the order of Giovanni Racich, Esq., Trieste, ran a successful fully loaded trial, when a mean speed of 10½ knots was obtained. For Launch, see October issue.

BOARD OF TRADE EXAMINATIONS.

AUGUST 22nd, 1912.—LONDON.—*2nd Class:* H. Cockeran, G. Wethey, C. Young.

NORTH SHIELDS.—*1st Class:* J. Forbes, G. Huntley, F. Key, H. Patterson, J. Schoestrand. *2nd Class:* G. Baird, W. Mowat, V. Quinit, H. Samuel.

PLYMOUTH.—*2nd Class:* L. Hugo.

GLASGOW.—*1st Class:* M. Conbrough, R. McCullock, T. Smith. *2nd Class:* G. Black, W. Gray, W. Hetherington, W. Millar, D. Ross, J. Urquhart.

SOUTHAMPTON.—*1st Class:* F. Sargent. *2nd Class:* D. Hall, A. Lawrence, D. Mackinnon.

LIVERPOOL.—*1st Class:* J. Barron, S. Battersby, G. Brade, E. Somerville. *2nd Class:* F. Sharp.

LEITH.—*1st Class:* C. Gourlay, H. Naydis, W. Tannock, J. Thomson, D. Urquhart, W. Urquhart. *2nd Class:* D. McConnell, C. Mackenzie, J. Morton, J. Murray, A. Porteus, A. Sutherland, J. Wood.

WEST HARTLEPOOL.—*1st Class:* A. Smith, J. Watt. *2nd Class:* M. Beedle, C. Peters, T. Reed, J. Watson.

CARDIFF.—*1st Class:* J. Cole. *2nd Class:* F. Bradley, G. James.

AUGUST 29th, 1912.—LONDON.—*1st Class:* E. Seymour. *2nd Class:* T. Hutchinson.

BRISTOL.—*1st Class:* H. Beszant. *2nd Class:* E. Hodges.

GREENOCK:—*1st Class:* W. Irvine, D. Robb. *2nd Class:* A. Collins, A. Mackintosh, T. Morton, F. Newton, A. Turnbull.

HULL.—*1st Class:* E. Hudson. *2nd Class:* J. Woodhead.

ABERDEEN.—*1st Class:* W. Cook, R. Milne, J. Skene. *2nd Class:* J. Alexander, W. Chalmers.

DOVER.—*2nd Class:* C. Hancock.

LIVERPOOL.—*1st Class:* J. Adams, A. Cederberg, W. Dougan, A. McLean, D. Owens, G. Venables, R. Walker. *2nd Class:* D. Forsyth, J. Gibson, F. Kingdon, N. Le Couteur, A. Murray.

NORTH SHIELDS.—*1st Class:* M. Austin, W. Brown, J. Love, C. Patterson, W. Robertson. *2nd Class:* H. Buglass, J. Ellis, R. Proctor.

SUNDERLAND.—*1st Class:* J. Parks, G. Swinson.

SEPTEMBER 5th, 1912.—LONDON.—*1st Class:* F. Colley, C. Thurlow. *2nd Class:* J. Riley, F. South, H. Upton.

BELFAST.—*1st Class:* N. Meikle. *2nd Class:* H. Corbitt, J. Hewitt, W. Kelly, R. Millar, J. Scott.

CARDIFF.—*1st Class:* W. Austin, J. Denley, H. Devonald, T. Jones, C. Payne. *2nd Class:* G. Gebler, H. Knight, R. Morgan, A. Waters, H. Williamson.

LEITH.—*1st Class:* W. Black. *2nd Class:* J. Walker.

FALMOUTH.—*2nd Class:* H. Warren.

SOUTHAMPTON.—*1st Class:* D. Barr, F. Sinclair. *2nd Class:* S. Nicholas.

LIVERPOOL.—*1st Class:* F. Bell, H. Griffiths, R. McIntyre, A. Shott. *2nd Class:* W. Buchanan, J. Ewart, S. Gould, J. Kelly, J. Roberts, G. Walker.

GLASGOW.—*1st Class:* R. Armour, L. McCallum, W. Moore, R. Samuels. *2nd Class:* J. Bald, R. Drummond, D. Graham, D. Gray, A. Husband, J. Lamont, C. Lennox.

NORTH SHIELDS.—*1st Class:* F. Carter, J. Clark, R. Sanderson, C. Smith. *2nd Class:* A. Carnaby, A. Hill, J. Johnston, L. Knott, R. Taylor, J. Young.

SEPTEMBER 12th, 1912.—LONDON.—*1st Class:* H. Sawyer. *2nd Class:* A. Aldridge, E. Buss, P. Larsen, A. Pinch, F. Smith, W. Wilson, A. Worley.

GREENOCK.—*1st Class:* S. Ewart, J. Giblin, R. Macfie, T. Robertson. *2nd Class:* J. McCracken, W. Mackie.

HULL.—*1st Class:* F. Hart, F. Lampard, J. Martin, S. Hall.

DUNDEE.—*1st Class:* D. Guild. *2nd Class:* C. W. Baxter.

LIVERPOOL.—*1st Class:* W. Coller, S. Hermans, H. McKnight, H. Pritchard. *2nd Class:* H. Cannon, J. Clarke, J. Lightfoot, F. Shimmin, J. Tobin.

NORTH SHIELDS.—*1st Class:* T. Bailes, G. Davis, R. Forbes, L. Foster, E. Jardin, M. McGillivray, N. Spendley, J. Ward, R. Wild, W. Wiling. *2nd Class:* W. Middleton, E. Milton, H. Scott.

SEPTEMBER 19th, 1912.—LONDON.—*1st Class:* N. McClumpha, W. Padbury, L. Tilley, R. Ward. *2nd Class:* L. Palmer, R. Sim.

CARDIFF.—*1st Class:* J. Campbell, W. Trewern. *2nd Class:* A. Brace, G. Harding, B. James.

GLASGOW.—*1st Class:* J. Hall, J. Gourlay. *2nd Class:* T. Blakeman, W. Bowie, J. Briggs, J. Brodie, A. Bryson, W. Gemmell, A. Taylor.

SOUTHAMPTON.—*1st Class:* C. Ray. *2nd Class:* J. Fairley.

LIVERPOOL.—*1st Class:* T. Bailey, R. Jones, J. Wilson. *2nd Class:* J. Belton, S. Braye, A. Campbell, G. Fabian, W. Galloway, J. Kessie.

LEITH.—*2nd Class:* A. Mitchell.

NORTH SHIELDS.—*1st Class:* H. Atkins, G. Pattison, A. Taylor. *2nd Class:* W. Brown, W. Hughes.

PLYMOUTH.—*2nd Class:* A. Reeve.

WEST HARTLEPOOL.—*1st Class:* R. Storey. *2nd Class:* E. Peacock, A. Standley, F. Todd, W. Vallis.

SEPTEMBER 26th, 1912.—LONDON.—*1st Class:* C. Clark, C. Coppinger, P. Coursens, J. Pollock. *2nd Class:* W. Johnson.

GREENOCK.—*1st Class:* J. Laurence, D. McNaught, J. Rankin. *2nd Class:* A. Chalmers, F. Chalmers, F. Curror, W. Fleck, W. Grant, D. Lyons, A. MacMaster, W. Rennie, J. Robinson.

SUNDERLAND.—*1st Class*: T. Bambro, J. Connolly, J. Crawford, V. Enms, F. Watt. *2nd Class*: N. Featonby, J. Kjelgaard, R. Lethe, W. Robson, R. Swanson.
LIVERPOOL.—*1st Class*: M. Baldwin, E. Bell, J. Moore. *2nd Class*: H. Allt, J. Goodfellow, C. Haswell, R. Hughes, J. Sheppard.
ABERDEEN.—*2nd Class*: G. Gibb.
NORTH SHIELDS.—*1st Class*: W. Bilclough, E. Landreth, J. Parry, E. Price, W. Wallace. *2nd Class*: R. Atkinson, G. Blenkinsop, F. Marr, R. Melhuish, C. Schmidt.
BRISTOL.—*2nd Class*: R. Charles.
LONDONDERRY.—*2nd Class*: J. Boyd.
HULL.—*1st Class*: H. Jackson. *2nd Class*: H. King, G. Watson.

OCTOBER 3rd, 1912.—LONDON.—*1st Class*: A. Hourston. *2nd Class*: G. Clarke.
NORTH SHIELDS.—*1st Class*: S. Bagnley, L. Pots. *2nd Class*: B. Augustine, H. Stevenson, R. Tennet.
GLASGOW.—*1st Class*: J. Bannatyne, W. McDade, W. McNaught. *2nd Class*: J. Cumming, A. Galbraith, J. Geddes, R. Milliken, J. Milne, J. Smith, F. Spencer.
LIVERPOOL.—*1st Class*: J. Hayes, S. Hepburn, D. Pimblett, J. Rae, M. Urruchua. *2nd Class*: J. Bywell, P. Collett, W. Dowd, J. Kay, J. McMullen, O. Roberts.
CARDIFF.—*1st Class*: W. Bowen, A. Fleming, L. Wilson, H. Woods.
LEITH.—*2nd Class*: E. Campbell, R. Gibson, A. Lingard, W. McIntosh.
BELFAST.—*2nd Class*: R. Close.

OCTOBER 10th, 1912.—LONDON.—*1st Class*: W. Cornell, T. Goodwin, W. Nicolls, P. Paynter. *2nd Class*: S. Halls, A. Taylor.
GREENOCK.—*1st Class*: W. Jones, T. Patterson, J Watt. *2nd Class*: J. Cairns, J Macfarlane, W. Miller.
DUNDEE.—*1st Class*: G. Birse, J. Fettes. *2nd Class*: G. Patterson, A. Sprunt.
LIVERPOOL.—*1st Class*: A. Aitchison, J. Gibson, A. Johnstone, J. Whittle. *2nd Class*: J. Beckerleg, J. Daykin, T. Freeman, G. Harris, G. Heron, H. Holmes, W. Jones.
NORTH SHIELDS.—*1st Class*: F. Frost. *2nd Class*: E. Carr, D. Gagie, R. Thompson.
HULL.—*1st Class*: W. Hardcastle, G. Hewson. *2nd Class*: W. Leaper.

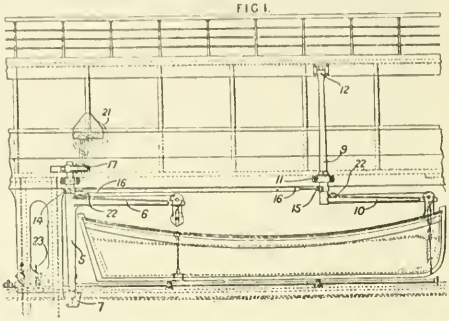
OCTOBER 17th, 1912.—LONDON.—*1st Class*: R. Bruce, W. Butler, W. Norris, E. Smith, T. Windebank. *2nd Class*: H. Daniel, J. Herd, B. Shortridge.
WEST HARTLEPOOL.—*1st Class*: T. Middleton, H. Potter. *2nd Class*: M. Mould, A. Robinson, A. Wilkinson.
PLYMOUTH.—*1st Class*: H. Edmonds, A. Ridholls.
CARDIFF.—*1st Class*: F. Conroy, F. Edwards, C. Hardyman, L. Jenkins, L. Karlen, O. McRoberts, A. Powell. *2nd Class*: J. Baker, R. Barrie, A. Bigham, H. Bronsdon, H. Gilbert, C. Henderson, W. Thomas, S. Widdas.
LIVERPOOL.—*1st Class*: O. Jones, H. Noble. *2nd Class*: A. Goodwin, J. Harwood, J. Hill, M. Murnaga, J. Young.
SOUTHAMPTON.—*2nd Class*: S. Hughes.
GLASGOW.—*1st Class*: J. Anderson, J. Prydie, J. Rankin, T. Scott. *2nd Class*: R. Brown, A. Boyd, W. Carlton, A. Clark, F. Da Silva, A. Fowler, W. Guy, D. McLeod, J. Stevenson.
LEITH.—*1st Class*: S. Cross, W. Erskine. *2nd Class*: E. Eliades. J. Grieve, A. Hamilton.
NORTH SHIELDS.—*1st Class*: D. Downie, A. Sharp. *2nd Class*: A. Dawson, J. Scurfield, R. Simpson.

The Marine Engineer and Naval Architect Patent Record.

Compiled by Messrs. E. P. Alexander & Son, Chartered Patent Agents, 306, High Holborn, London, W.C.

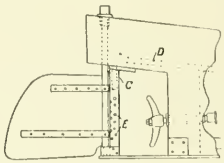
14,511. Boat-lowering Gear. Relates to boat-lowering apparatus to enable the boats to be carried on a lower deck instead of the top deck of a vessel; this enables one davit to be supported from above the boat so that the distance between the axes of the davits is less than the length of the boat, which can cross the axis of that davit when swung out. The stern davit post 5 carries an arm 6 and is stepped in a bracket 7 on the ship's side. The bow davit 9 carries an arm 10 and turns in bearings 11, 12 on the upper decks.

FIG 1.



The davit arms are always kept parallel, as the davits are provided with short arms 14, 15, connected by a link 16. The davits are operated from a hand-wheel 21 connected up by worm gearing with a quadrant 17 on the davit 5. The falls are led back along the davit arms to sheaves 22, and thence to a hoisting-drum 23.

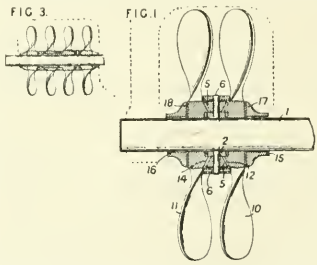
14,710. Ships. Exhaust Gases, Discharging. Vessels propelled by internal-combustion engines are provided with tubular rudder-posts *c* into which the exhaust from the



engines is delivered by pipes D. By discharging into the wash of the propeller, the suction produced reduces the back-pressure. The holes E in the hollow post C are all situated aft.

15,029. Propellers. Power from a single source is uniformly distributed among several propellers mounted on the same shaft. A ring 2, Fig. 1, is fixed to the propeller shaft 1, and carries a number of bevel-wheels 5 mounted on pins 6. Two propellers 10, 11, are furnished with bevel-gear faces 12, 14, gearing with the pinions 5. Thrust-block 15,

FIG 3. FIG 1.



16, with antifriction metal rings 17, 18, are fixed to the shaft. The propellers are rotatably mounted on the shaft. In Fig. 3, four propellers are shown, the third propeller aft being mounted on an extension of the boss of the second. Since each propeller receives the same amount of power from the pinions 5, each rotates at a speed which enables it to absorb that power. Specification 18,739/10 is referred to.

The Marine Engineer

And Naval Architect.

LONDON, DECEMBER, 1912.

THE PROGRESS OF WARSHIP ENGINEERING.

THE relative merits of the steam engine and the internal combustion engine for ship propulsion have occupied the attention of engineers for some years past, and the development of the internal combustion engine for the propulsion of commercial ships has led some people to think that the subject was not receiving the attention it should from naval authorities, seeing the small extent to which such systems have been employed in naval ships up to the present. Many advantages have been claimed and proved on the side of the internal combustion engine particularly. For warship propulsion, for example, such an engine is entirely self-contained and independent, it does not receive its motive power from a distance, the absence of boilers and large funnels allows a more efficient arrangement of guns and magazines, and diminishes to a considerable extent the possible amount of wreckage during an action. The troubles that have been in evidence recently in steam-driven craft owing to the too close proximity of the bridge and forward funnel to one another are avoided, while the fact of no smoke and no flame being produced increases the invisibility of the vessel, not only by night but also by day. The importance of this point will be readily recognised by anyone who has seen recent photographs of war ships running at full speed. The "ever readiness" of the motor warship is a feature of advantage of the greatest importance. There is no lighting of fires required or any necessity for waiting to get up steam, no banking of fires in the case of a long and anxious blockade so as to maintain such conditions as to be ready to start off in pursuit of an enemy at a moment's notice; in fact, the measure of a vessel's readiness may be taken as the time necessary for buoying and slipping her cable. Quick coaling, even at a great expenditure of energy on the part of a ship's company, has also been considered a matter of the greatest importance, but the irritating and wearisome character of the work carried out after coming back from an action, having to go out again and fight immediately, when coaling is completed, is entirely obviated when using oil fuel, as the operation can be effected without calling upon the crew for any energy whatever, and, it must be remembered, can be carried out at sea in weather which would preclude the possibility of the transfer of coal at all. We need not go into another feature which has been dealt with so fully over and over again, *viz.*, the radius of action of a motor warship being nearly three times that of a steamship with coal-burning boilers of an equivalent displacement, or nearly twice as much as a steamship using liquid fuel in her boilers. It is now generally recognised that the strategic advantages of the motor ship over the steamship are very great. We should now like to draw attention to an aspect of the question which, as far as we know, is an entirely novel one, and is presented by Mr. C. De Grave Sells in the 1912 edition of *Fighting Ships*, which appears to us to be of such importance as to deserve the fullest publicity. Mr. Sells, while recognising all the advantages, points out certain counter-balancing disadvantages, which we feel sure must be realized only too well by those who have had experience with the new class of machinery. In fact, to put it shortly, the drawbacks which manifested themselves in the steam reciprocating engine of the past are developing themselves even in a more pronounced form in the quick-running oil engines of large power of to-day, and there is no wonder that the naval engineer and naval architect are somewhat loth to encourage development along the suggested line, having regard to their steam experience in front of them. It can be said that there is no want of enterprise, as such has been proved over and over again by the way in which the turbine steam engine has been adopted by so many engineers and shipowners as soon as its advantages had been thoroughly established. It will be remembered that before the steam turbine had been brought to a condition of practical success, the running of full power trials with reciprocating engines was only done by the imposition of immense strain both on the men and on the machinery. The efforts made to obtain lightness in the propelling machinery and to cut down the weight and sizes of boilers only increased the difficulty of maintaining the steam pressure, and the greater part of the battle of a full power trial had to be fought out in the boiler rooms. When the boiler side of the problem had been tackled, it only meant that the battle was transferred to the engine room. The number of revolutions was increased, while the stroke had to be kept comparatively short in order to keep the cylinders below the protective deck, which in its turn was kept below the water line. The inevitable difficulties which always manifest themselves in every mechanical device for transforming a reciprocating motion into a circular one were continually being increased, and it was a matter of sincere congratulation to all parties when a long trial run at full power was completed without difficulty or without mishap, and then only owing to the intense vigilance on the part of those responsible. It was after a period of such conditions that an entire change came about with the advent of the turbine engine, and neglecting for the moment the small troubles that are always experienced with new machinery and have to be overcome, the onerous conditions which obtained with a reciprocating engine entirely vanished when the steam turbine took its place. Not only did all the

troubles as regards running and upkeep incidental to a reciprocating engine disappear, but it was found that there was no greater difficulty at full speed running than at low speed running, and the engine-room staff were not taxed to any greater extent in one case than in the other. In view of the fact that this change from the reciprocating engine to the purely rotary engine is so recent, it is not surprising that there is a distinct disinclination to hastily return to a reciprocating engine until such engine shall have been thoroughly well tested under all possible conditions, and one is satisfied that inevitable difficulties incidental to a new motor are overcome in an assured manner before the abandonment of a type of engine which has proved to have such immense advantages over what was in use before it. One is forced to the conclusion that for many of the services that are required of a warship, steam will probably prove the best motive power for some time to come, and further, for both the main propelling engines and the auxiliary machinery of large warships, there are many questions to be resolved and many difficulties to be overcome before internal combustion engines of the reciprocating type become generally adopted for all purposes on such vessels. The various naval authorities are not leaving the matter to go by default, which is proved by what has been done in the British, German, Russian and United States navies, and we believe it is recognised that the rate of progress to-day is many times greater than that of any period during the past century, and that the progress of the last twelve months is greater than that of any preceding year. The rate of development in the year to come will be greater still, and one may predict that not only will a further advance of considerable magnitude be effected, but that such advance will have attached to it the greatest possible interest to, and bearing on, naval matters in the future.

ELECTRIC TRANSMISSION

IN a paper read by Mr. W. P. Durtnall, entitled "The Generation and Electrical Transmission of Power for Marine Transportation," at a meeting of the Society of Engineers, some interesting particulars were given of the arrangements that have been installed in the twin-screw collier *Jupiter* by the United States Government, to which we referred in our last issue. This vessel is of 20,000 tons displacement and about 6,000 horse-power. The difficulties of commutation and other matters set up between the generators and motors are overcome by using polyphase currents. The turbine runs at 2,000 revolutions per minute, and the speed reduction is effected by putting more poles in the motors than in the generators, thus the maximum efficiency can be obtained with slow-running screw propellers and the shaft horse-power kept down to economical limits. In order to start the motors from rest and to develop sufficient torque to reverse the propellers when desired, special arrangements have been made with a satisfactory result. The difficulties which might have expected as to frequencies and voltage have been overcome by adopting a motor of squirrel-cage construction. Its very simple design and structure gives it great mechanical strength and great reliability. No slip rings or brush gear are used, the whole of the current in the rotor winding being induced across one air gap, thereby gaining a tremendous advantage over contact conduction machines. The machine has no sparking limit, and its efficiency is therefore very high. The results of the trials of the *Jupiter* will be awaited with interest.

"TITANIC" ENGINEERING STAFF MEMORIAL.

We have received reports as to the growth of this fund as follows:—

Institute of Marine Engineers, London, up to Nov. 26th ...	£2,402 0 0
Southampton Committee (for the erection of a monument in Southampton), up to Nov. 26th	1,550 16 0
Liverpool Committee (for the erection of a monument in Liverpool), up to Nov. 26th	4,818 18 6
Total	£8,771 14 6

TECHNICAL SOCIETIES.

THE advantage of publishing subjects of papers and dates of meetings for a half or complete session has been more and more recognised by the different Institutions. Appointments and engagements are so numerous that early intimation is of great value and importance, hence we propose to publish these as far as possible.

Inst. of Naval Architects, London.—The spring meetings have been fixed for March 12th, 13th and 14th, 1913.

Inst. of Marine Engineers, London.—The programme for the month is as follows:—December 2nd, Discussion on Mr. A. E. Battle's paper, "Wave motion and modern developments in high-frequency electricity." December 9th, Discussion on Mr. P. P. Dowden's paper, "The manufacture of iron." December 16th, a paper on "The lessons of collisions at sea and some suggestions," by Mr. G. W. Newall. December 31st, social evening for the Junior Section.

North-East Coast Inst. of Engineers and Shipbuilders, Newcastle-upon-Tyne.—Meetings have been arranged for December 20th, 1912, and in 1913, January 24th, February 21st, March 28th, April 25th. The Institution rooms are open daily. The subjects of the proposed papers are:—"The structure of medium and low carbon steels" (Dr. Stead), "Influence of form on the running costs of vessels" (Col. R. Saxton White), "Utilization of waste heat" (Mr. Mountain), "Industrial organization" (Mr. G. Parker), "Surface combustion" (Dr. Bone), "Arch principle of ship construction" (Mr. Maxwell Ballard), "The architecture of the Heavens" (Sir David Gill), "Auxiliary machinery for marine purposes" (Mr. A. H. Finch).

North-East Coast Inst. (Graduate Section).—The following papers are down for reading. December 14th. "Developments of the Aeroplane," by Mr. C. Ian Burrell. In 1913, January 11th, "Yacht Design," by Mr. M. W. Parker. February 1st, "Pipe Design," by Mr. J. Dickinson. February

22nd, "Oil-burning Installations in Marine Boilers," by Mr. E. T. Champness, B.Sc. March 15th, "Transmission of power by Chain Drive," by Mr. M. Ba-Gyaw. April 26th, "Four-cycle Marine Diesel Engine," by Mr. Summers Hunter, junr.

Inst. of Engineers and Shipbuilders in Scotland, Glasgow. —During the session the following meetings are still to be held. December 17th, 1912, and in 1913 for January 21st, February 18th, March 18th and April 22nd. The following papers are to be read:—"Recent developments in wireless telegraphy," by Mr. J. Erskine Murray, D.Sc.; "Subdivision of ships," by Mr. J. Bruhn, B.Sc.; "Boat lowering appliances," by Mr. A. Welin; "Oil-carrying steamers," by Mr. J. Montgomerie, B.Sc.; "Injuries to steel, subsequent to its manufacture," by Mr. C. H. Desch, D.Sc., etc.; "Oil fuel for power purposes," by Prof. Thomas Gray, D.Sc., etc., and Prof. A. L. Mellanby, D.Sc.; "Moulding machinery for foundry purposes," by Mr. T. Macdonald. Mr. Wm. Weir recently read before this Institution a paper on "Development in auxiliary units between exhaust pipe and boiler."

Association of Engineers in-Charge, London. —The programme of meetings and papers are, December 11th, 1912, "Modern methods of electric wiring," by Mr. Frank Bailey; January 8th, 1913, "The principles of refrigerating machinery," by Mr. R. J. Crackneil; February 12th, "Control of alternating current motors," by Mr. J. T. Mould; March 12th, "The province of the engineer-in-charge," by Mr. A. E. Penn. April 9th, "Design and economy of Diesel oil engines," by Capt. Sankey. The annual dinner will be held on April 12th.

A NEW ELECTRICAL SCALING APPARATUS.

THE rapid and efficient removal of boiler fur has always proved a particularly annoying problem to steam engineers, and for many years past these latter have sought in vain for a satisfactory solution of the difficulty. Many devices, constructed on various principles, have been put forward from time to time, but, in most cases, these have proved unsatisfactory in practice, so that at the present day the older methods, *viz.*, the use of the chipping hammer, scraper and, in some cases, the pneumatic hammer are still generally employed. The prevention of the formation of fur by the chemical treatment of the water has proved on the whole far from satisfactory. In the first place, the plant for this purpose requires very careful attention, and is very expensive, both in initial cost and in the cost of upkeep; then, again, it has certain distinct disadvantages, and, finally, when all is said and done, it does *not* satisfactorily prevent the formation of fur, so that cleaning of the boilers from time to time becomes necessary in any case. Every steam engineer who has carefully studied the practical working of his plant will be aware of the truth of these statements.

Now the chipping hammer, scraper and pneumatic hammer can only be used satisfactorily when the fur is at least $\frac{1}{8}$-in. thick, and it is contended that it is the hard thin layer of deposit and rust which presents the greatest difficulties in removal.

In order to supply such a want as indicated the Electrical Engineering and Equipment Co., Ltd., of 109, New Oxford Street, London, W.C., have placed on the market a device which is capable of dealing with scale of any thickness and of any nature, adapted to be operated by a speed quite unattainable by hand or pneumatic tools, in such a way as to clean the surface under treatment far more efficiently than can be effected by the older methods.

The apparatus, which is illustrated in the adjoining diagrams, consists of an electro-motor, mounted in a special box and connected by means of a flexible shaft to an ingenious cleaning device consisting of a flat metal drum provided at three points in its periphery with steel wheels loosely centred on pins. The cleaner is shown complete in fig. 1, while the tool itself is shown in fig. 2, and the details of it in fig. 3.

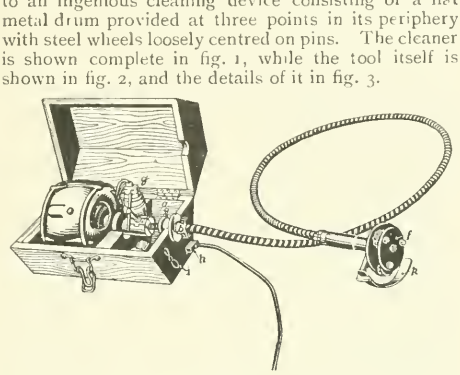


Fig. 1.

When the drum is caused to rotate by starting the motor, the steel wheels, which have somewhat the appearance of milling cutters, fly outward by centrifugal force, and exert a continuous hammering action upon any surface against which they are pressed. At the same time, owing to the formation of the wheels, a tearing action is exerted simultaneously with the hammering. The motor makes 2,600 revolutions per minute, so that it is possible to obtain 10,400 hammer blows per minute. These figures alone suffice to give an idea of the vastly quicker rate of working which is attainable with this apparatus in comparison to either pneumatic or hand tools. The steel hammering wheels being loosely mounted on the pins can retreat inward after each blow, and can also rotate about

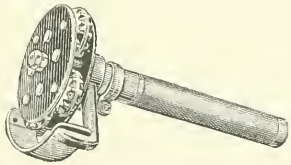


Fig. 2.

their axis, in consequence of which vibration to the hand of the operator is avoided, and the sharp edges of the wheels are protected against unnecessary wear. The centrifugal force exerts at the same time a natural spring action which takes up the shock of the hammer blows so that the apparatus is entirely free from vibration.

The box containing the electro-motor is made of such a size and shape that it can be easily lowered through the manhole of any boiler, and is furnished with a small chain connected to the motor switch and projecting from the end of the box, so that the apparatus can be started and stopped by the workman by simply pulling the chain.

The flexible coupling is so adapted that the core can be easily removed in its entirety from its protecting tube, enabling it to be lubricated in the simplest manner with a mixture of graphite and oil. In this

way the lubrication difficulties so common to flexible shafting are entirely avoided.

The drums are made in five different diameters, *viz.*, from $\frac{3}{4}$ in. up to $5\frac{1}{4}$ in., and the hammer wheels are chosen to suit the varying sizes of drum. The weights of the wheels and the drum are also varied, so that the strength of the hammer blows can be altered according to the thickness and nature of the surface which is being cleaned. In this way the apparatus can be adapted to the greatest variety of cases.

To use the apparatus it is merely pressed up against the surface and moved quickly backwards and forwards with the left hand, whilst being steadied with the right hand. Very little pressure is requisite, in fact, too much pressure must not be applied.

We understand that it has been proved by practical tests that the apparatus enables the work to be carried out at least three to four times as quickly as with the best hand apparatus, and, where very thin deposits are concerned, the advantage is still more marked, the speed attained reaching even as much as forty times that of the hand tool.

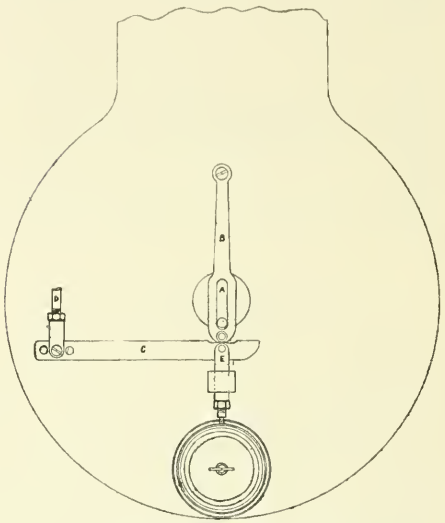
Fig 3

Some very interesting tests of the apparatus were recently made by Messrs. Harland & Wolff in Belfast. In the first place the use of the apparatus was shown on the side of a vessel in dry dock, and since, in many places, the scale was too thin to require use of the special wheel hammers, the steel wire brush, which is also supplied with the apparatus, was brought into action. The simple passage of this over the surface of the steel cleared away the thin deposit immediately, thus enabling a very high speed of working to be obtained. In the second case, the apparatus was used on the interior surface of a boiler with a most effective result.

Some very interesting comparative trials have also been made at the works of Messrs. Swan, Hunter and Wigham Richardson, Ltd., of Wallsend. The experiments were made on the outer plates of a Russian volunteer ship which was undergoing repair in the dockyards of the firm named. Two equal areas were marked out on the surface of the vessel. A practised workman chosen from the staff of the firm was set to clean one marked area with a pneumatic hammer, whilst the other marked area was cleaned by the Electrical Engineering and Equipment Co.'s apparatus. The time taken by the former was about six seconds as compared to four seconds with the latter.

AN ENGINE-ROOM TELEGRAPH TELL-TALE OR ALARM.

THE illustration shows a simple device designed and patented by Mr. J. D. Smith, a marine engineer serving on the coast of India. It has been fitted on one steamer in India and found to work satisfactorily. A disc crank A is fixed to the telegraph shaft and works a hinged link B, which moves to either side of the centre or "stop" position, according as the telegraph pointer moves to the ahead



Engine-Room Telegraph Alarm

or astern side. The lever C is connected by the rod D to the starting lever or wyper shaft of the engine, and is so fixed that when the engine is being made to move in a direction contrary to that indicated on the telegraph dial, the lever C, pressing against the end of the link B as a fulcrum, depresses the rod E, which causes a clock-work bell to ring, thereby warning the engineer; so long as the engines move in the proper direction B and C do not come in contact.

Messrs. Cochran & Co. (Annan), Ltd., have supplied to the s.s. *Carron Park*, launched by Messrs. Mackay Bros., Alloa, a Cochran (Annan) donkey boiler, fitted with a patent seamless furnace.

New Naval Contracts for Clyde Firms. Telegrams making provisional contracts for the two battleships provided for in the current year's Navy Estimates were sent out by the Admiralty on November 23rd, the recipients being the Fairfield Shipbuilding & Engineering Co., Ltd., Govan, and John Brown & Co., Ltd., Clydebank, who are each to build and engine one of the vessels. They are to be similar to the two which were recently laid down at Portsmouth and Devonport respectively, that is to say, of about 27,000 tons displacement, and fitted with turbine machinery of between 50,000 and 60,000 h.p., to give them a speed of about 25 knots. Their armament will consist of eight 15-inch guns, arranged in pairs on the middle line of the ship, and sixteen 6-inch guns. Each vessel will cost fully £2,000,000, and will take about two years to complete, and the contract boats will be named *Valiant* and *Barham*.

*THE USE OF GASES ON SHIPS FOR FIRE EXTINCTION AND FUMIGATION.

By Mr. E. KILBURN SCOTT, A.M.Inst. C.E.

PART I.

FIRE is one of the principal risks of sea transport, because it is an ever-present one. As the interior fittings of passenger vessels become more and more elaborate so does the fire risk increase, but, of course, the greatest danger lies in the holds, and it is with the latter that this paper is principally concerned. The possible damage due to a fire increases as steamships increase in size. The larger the holds the more non-conducting material there is between the seat of the fire, for it generally breaks out in the centre, and the cool surfaces of the skin of the vessel or the deck above. The problem of fire extinction on ship-board is in some respects similar to that which fire brigades ashore have to deal with. An ocean liner may be considered as analogous to a theatre or hotel, where human life is principally involved, while a cargo boat is similar to the warehouse or store where economic interests are at stake. The resemblance ends there, because a ship's fire differs from a fire in a building in that it can only be attacked from above. Also, as it is in an enclosed space and partly below water level, water has to be very carefully used. A principal difference lies in the fact that it is possible to make use of inert gases for fire extinction. The methods of extinguishing fires on board ship are :— 1. Closing the hatches. 2. Flooding the holds with water. 3. Blowing in steam. 4. Blowing in an inert gas. The inert gases generally used are (*a*) carbon dioxide gas, (*b*) sulphur dioxide gas, (*c*) flue gas.

Closing the Hatches. — This method is seldom really effective, because air usually leaks into the hold in sufficient quantity to keep the fire alight, and even when the flames are extinguished there is great danger of the fire breaking out again when the hatches are opened. The problem is not merely to arrest combustion, but to reduce the general temperature to a point at which air can be safely readmitted.

Flooding with Water.—By reason of the latent heat of steam a large amount of heat can be quickly absorbed by evaporating water, but of course much water may be poured in without any of it reaching the seat of the fire. When the water does reach the fire the volume of steam given off acts in two ways, (*a*) by absorbing heat in its vaporization, (*b*) by filling the hold and so displacing air. The principal objections to water are, that it may seriously damage the cargo and also endanger the stability of the vessel.

Many cargoes retard the percolation of the water, for example, coal and grain, also fibres, such as cotton, wool and jute. Grain is especially resistant to the passage of water, while wool and jute are usually packed in so tightly that they are almost as bad. There is a further danger with such cargoes, that when wetted they swell, and may twist the framing of the ship. Of course, water is the only medium possible for deck cargoes and for magazines containing explosives.

British war vessels rely solely on water, but gas apparatus, as described below, has been fitted on some foreign warships.

Blowing in Steam.—Steam has the advantage that it can be quickly turned into a hold, but its value as an extinguisher depends principally on its displacing the air, and this depends on the amount of condensation. With some cargoes and in cold weather the penetration may be very small, owing to condensation, unless the cargo is well alight. If steam is used for putting out a fire then there is so much less for the propulsion of the vessel in those cases where it is necessary to beach the vessel with all speed. One grave danger in driving steam through a cargo that is well alight is that the steam may react with carbonaceous material to produce the explosive gases, carbon monoxide and hydrogen. That this is a real danger is shown by the following statement of Prof. Vivian B. Lewes.

" I must confess that I have a strong prejudice against the use of either water or steam for coping with a fierce fire in a ship's hold, as under certain conditions they may give rise to troubles as bad as those they are intended to cure. Take, for example, a fire in a coal cargo. There is a mass of coal in the hold, with a pocket of incandescent coal near the bottom; the difficulty is in the first place to get at it, and the first impulse is to pump water in and let it find its way to the seat of the combustion. The water, however, cannot get freely to it in quantity, having to filter its way down through the interstices of the coal, meeting as it does so the hot products of combustion, and becoming evaporated in cooling these. The portion that does reach the seat of the combustion, on coming into contact with the red-hot mass of carbon, is largely converted into water gas, a mixture of carbon monoxide and hydrogen, which only requires a small proportion of air to convert it into a highly explosive mixture. This, collecting under the decks, explodes, ripping up the deck and blowing off the hatches, thus letting in free access of air to carry on the combustion, which generally leads to the total loss of the ship.

" It is even more difficult to get steam to the required spot, and steam, like water, is decomposed into water-gas by incandescent carbon. The cooling action that steam has upon the burning mass is far less than would be the case with water, the chief value of which as an extinguishing agent is the large amount of heat rendered latent during its vaporization."

At the same time it is interesting to note that a steam system—the " Rich "—is in use on about thirty vessels, including some of the largest afloat. For example, the Cunarder steamships *Mauretania, Lusitania, Franconia, Laconia, Aquitania,* and the Standard Oil Co.'s steamships *Seneca, Kennebeck, Schuykill, Hudson.*

One reason why the Rich system is used is that it is designed for fire-indicating as well as fire-extinguishing. Galvanized iron pipes carried along the sides and between cargo timbers connect to every compartment and bunker, the extreme ends being fitted with saucer-shaped smoke catchers. The other ends of the pipes are brought together to an " indicating station," which is placed in the wheel-house. It contains an electric fan which a clockwork mechanism switches into operation every fifteen minutes. The fan, which runs for a few minutes, sucks up through the pipes any smoke that may exist in any compartment, and as each tube in the indicator is marked with a number which corresponds with the number of the compartment or bunker the exact location of the fire is known at once.

A hose, attached to the main steam pipe, is kept within convenient reach, and as soon as smoke is seen to issue from any one of the pipes the hose is attached to it, and steam turned on. The Rich apparatus is shown in Fig. 1.

It is customary when an officer comes on duty for him to make a test for smoke and enter the result in the ship's log.

The Use of Gas.

Gas is the best medium for fire extinguishing, because a captain naturally hesitates to inject steam or pump water into a hold full of valuable merchandise. The ideal gas must be a non-supporter of combustion, must not condense, and must not injure the cargo.

Naturally carbon dioxide is the first one to suggest itself, and it is of interest to note that so long ago as 1875 Mr. J. Glover proposed its use. His method of preparing the gas was not feasible, however, as he required about 4 tons of hydrochloric acid and chalk for every 1,000 tons of cargo.

A Commission of Enquiry sitting about that time reported as follows :—" Several methods of generating carbonic acid gas and applying it to the ignited portion of a coal cargo have been proposed for our consideration. We consider, however, that although this gas might be useful by excluding atmospheric air (which is essential to support combustion), yet it will not, as water does, exert any very sensible cooling effect, *which is a point of vital importance in the case of a mass of ignited coal.* We are of opinion that water and steam are the only agents practically available for the purpose of extinguishing fire in coal cargoes."

In 1900 Prof. Vivian B. Lewes suggested (The Spontaneous Ignition of Coal Cargoes, Institution of Naval Architects, Proceedings, vol. 31, p. 217) that liquid carbon dioxide might be used. His plan was to close the nozzle of the steel bottles with an alloy of tin, lead, bismuth and cadmium, which would melt at 200°Fah. The steel bottles were to be

* Read before the Institute of Marine Engineers on November 18th.

buried in the coal during loading and if by any chance the temperature should rise to 200° Fah., equivalent to a pressure of 1,700 lbs. per square inch, the plug gave way. The contents would thus be blown into the surrounding coal, giving an atmosphere that would not support combustion and producing a zone of intense cold. As 100 cubic feet of gas can be contained in a steel cylinder 1 foot long and 3 inches diameter, and as one ton of coal has 12 cubic feet of interstices, a cylinder full of gas would fill the interstices of 8 tons of coal.

Whilst on the subject of coal cargoes it will probably be of interest to refer shortly to some facts which have been made public recently regarding spontaneous combustion.

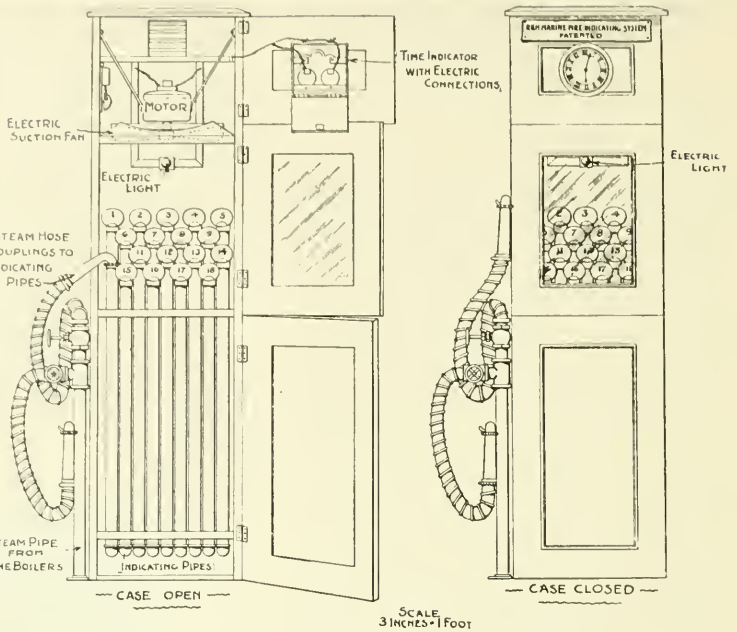
Spontaneous Combustion.—A full report on the subject of Fires on Coal-laden Ships, dealing exhaustively with questions of spontaneous combustion, has been recently issued by the Chief Engineer-Surveyor of Lloyd's Register of British and Foreign Shipping.

The report states that the presence of pyrites in coal has not the prejudicial effect formerly attributed to it, and also that wet or damp coal is not in any way more dangerous to carry than dry coal. The most dangerous coals are those which are most friable and richest in lighting gas. The spontaneous ignition of masses of coal is due to the absorption of oxygen from the air in the interstices of the coal. The absorption of oxygen is accompanied by a rise of temperature, but whether the heat so formed will be retained or lost depends entirely upon the conditions.

If the coal be in a small mass and surrounded by a conducting medium, such as air, or if it be in large mass but freely ventilated, the temperature of the mass will not appreciably rise, since the heat produced by oxidation will be rapidly carried away. If, on the other hand, the conditions are such that access of air to the centre of the heap can only take place slowly, the temperature of the mass will begin to rise and will continue to do so as long as the heat gained by oxidation is greater than that lost by conduction and radiation.

The report of Lloyd's Register states that after full consideration of all the evidence, it is considered that without doubt coal cargoes should not have any through ventilation as there would be great difficulty in ensuring sufficient ventilation in all parts of the cargo. The risk of generating heat in places untouched by a rapid air current would be too great. It would be safer if M. Fayol's suggestion of hermetically sealing the holds could be carried out, making, however, provision for the escape of the inflammable gases evolved during the voyage. If this method could be adopted, care would have to be taken to ventilate thoroughly the holds before discharging the cargo.

From the above it will be seen that if some system were installed on coal-carrying vessels by which, periodically, inert gases could be swept into the holds, all danger from both spontaneous combustion and the accumulation of inflammable gases would be ended. Not only so, but the coal would arrive at its destination in better condition, since the oxidation of coal means deterioration.



The Rich Apparatus for Fire Indicating and Extinguishing.
Fig. 1.

In the case of Oil Fuel. By keeping the space above oil tanks filled with inert gas, ventilating pipes are done away with and there is no risk of explosion. Further, when the oil is withdrawn from the tanks it is only necessary to keep on admitting the inert gas instead of air. This method is used in the case of some of the oil tanks along the Thames, but nitrogen gas is used, probably because it is a bye-product of the oxygen-making process and is cheap.

Percentage of Oxygen to Sustain Flame. — Although it is common knowledge that air is necessary to sustain combustion, and that oxygen is the active element, it is by no means well known that a fire will not burn unless oxygen is present in fairly large proportions.

Two papers by Professor Clowes and Mr. Feilmann in the Journal of the Society of Chemical Industry for 1894 and 1895 detail some interesting researches on this subject.

In the first series of experiments the object was to ascertain the minimum proportions of carbonic acid gas and nitrogen, which when mingled with air are extinctive to the flames of various combustible liquids and gases. The method of experiment consisted in mixing the measured volume of the air and gas by the motion of a light ball, so as to avoid the solvent action of water on the carbonic acid. The experimental flame was introduced into these mixtures, which were varied in composition until the flame was immediately extinguished, but continued burning for a short time in a mixture containing one per cent. less of the extinctive gas. It was found that the size of the flame had no influence on the extinctive properties.

The results obtained, which are set forth in the first 6 columns of the table given below, showed (1) that carbonic acid gas exerts a uniformly more powerful effect than nitrogen; this, it is suggested, may possibly be partly due to its higher density, which slows down the movement of air to feed the flame: (2) that the different wick-fed flames are extinguished by a strikingly uniform proportion of the extinctive gas: (3) that the extinctive proportion for the various

gas-fed flames varied widely, and did not appear to be deducible from the composition and chemical nature of the gas which was burnt. The extinctive proportion for a coal gas flame was much larger than for the wick-fed flame; also the extinctive proportion for the hydrogen flame was extraordinarily high.

The second series of experiments was undertaken to determine the composition of the residual atmospheres produced by flames when they were allowed to extinguish themselves in a confined volume of air. The results are given in the last three columns of the table.

Substance Burnt.	Percentage.	Composition of mixture.		Percentage.	Composition of mixture.		Percentage composition of the "residual atmosphere" in which flame was extinguished.		
	CO_2	O_2	CO_2	N_2	O_2	N_2	O_2	N_2	CO_2
	A			B					
Alcohol absolute	14	18·1	81·9	21	16·6	83·4	14·9	80·7	4·35
Alcohol methylated ..	13	18·3	81·7	18	17·2	82·8	15·6	80·2	4·15
Paraffin oil lamp	15	17·9	82·1	23	16·2	83·8	16·6	80·4	3·0
Colza & paraffin..	16	17·6	82·4	22	16·4	83·6	16·4	80·5	3·1
Candle	14	18·1	81·9	22	16·4	83·6	15·7	81·1	3·2
Hydrogen	58	8·8	91·2	70	6·3	93·7	5·5	94·5	
Carbon monoxide.	24	16·0	84·0	28	15·1	84·9	13·4	74·4	12·2
Methane	10	18·9	81·1	17	17·4	82·6	15·6	82·1	2·3
Coal gas	33	14·1	85·9	46	11·3	88·7	11·4	83·7	4·9

Column A gives the percentage of carbon dioxide added to air to produce extinction. Column B gives the percentage of nitrogen added to produce extinction.

It will be noticed that while the proportions of oxygen in the residual and in the artificially mixed atmospheres are very similar, yet in most cases the percentages of oxygen in the residual atmosphere from the flame is slightly less than it is in the artificial mixture which just extinguishes the flame. This occurs in spite of the fact that in the former case a large amount of steam must have condensed, thus making the apparent percentage of oxygen higher than would really be the case during the combustion. Professor Clowes and Mr. Feilmann suggest that this is very possibly due to the fact that in the case of a flame forming its own extinctive atmosphere in a confined space, the temperature of the surrounding atmosphere is finally raised considerably, and thus tends to keep the flame alight.

They point out that the extinctive atmospheres produced by ordinary flames approximate closely in composition to the composition of the air expired from the lungs; thus air expired after the breath has been held for forty seconds contains oxygen 14·9 per cent., carbonic acid gas 3·7 per cent., nitrogen 81·4 per cent. Atmospheres of such composition would not, according to researches published by Dr. J. S. Haldane, produce any noticeable inconvenience when breathed. This fact has again been brought forward by Dr. Leonard Hill in his presidential address to the Physiological section of the British Association, 1912. It follows that atmospheres which extinguish any flame ordinarily used, may yet be perfectly safe to breathe. Taking a general view of the figures in the last three columns of the table, it will be noticed that all oil flames are extinguished when the oxygen falls to about 16 per cent. A Methane flame is extinguished at about the same point, while a coal gas flame requires the reduction of the oxygen to 11·4 per cent.

These results are of the highest importance from the point of view of the extinction of fire in enclosed spaces. It is clear that if by any means the air in a space, whether it be the hold of a ship, an oil storage tank, or other space, can be displaced wholly or in part by some other gas not itself a supporter of combustion, so that the ratio of oxygen to other gases is reduced sufficiently low, the fire must be extinguished.

Although the earlier attempts to use gas were not successful, the very obvious advantages kept the matter uppermost in inventors' minds, and to-day there are three different systems at work. They are

1. The Gronwald system, using pure carbon dioxide which is stored in steel cylinders.
2. The Clayton system, using sulphur dioxide, which is made from raw sulphur in a special apparatus.
3. The Harker system, using the waste flue gases from boiler furnaces.

It is proposed to describe these three systems and then institute some comparisons between them.

The Gronwald Apparatus, with Gear for Carbon Dioxide Gas.

A. Gas Cylinders.
B. Apparatus.
C. Steam Inlet.
D. Steam Inlet.
E. Gas Hoses.
F. Deck Plates.

Fig. 2.

Pure Carbon Dioxide Gas.

The fire extinctive gas is stored in steel cylinders under pressure, so that no machinery is required to deliver it; steam or water is necessary to provide heat for the gas for the reason explained below. The apparatus is shown in Fig. 2.

A feature of the system is that the gas acts not only as an extinguisher by diluting the air but also as a cooling agent, because of the low temperature produced. The bottles are the usual seamless steel type tested to 4,000 lbs. per square inch, and at ordinary temperature the working pressure is about 765 lbs. per square inch. One method of preventing clogging of the discharge is to provide a water jacket between the bottle and the reducing valve. This will do for a slow discharge, but for the very quick discharge necessary for fire-extinguishing, the water chambers would have to be large and the water have to be heated. There is danger in this, because if the discharge of carbon dioxide were stopped from any cause, heating of the liquid gas in the cylinder would take place and lead to an explosion.

In the Gronwald apparatus the gas is not heated in its liquid state, but only after its issue in the vaporized condition. The heating medium is thus brought in contact with the gas in a fine state of sub division and consequently acts thereon without danger of the heat being carried back to the storage vessel.

The heating medium may be steam or else water of ordinary temperature. The former is employed on steamers whilst water is used on sailing ships, it being pumped through the ordinary deck pumps.

By means of a special valve and steam, a 40-lb. bottle can be emptied in five minutes, whereas with an ordinary reducing valve it would take half an hour. Each lb. of liquid gas expands to about 8 cubic feet of gas at atmospheric pressure. A cylinder weighing about 1¼ cwts. contains 40 lbs. of liquid or compressed carbon dioxide, and 50 cylinders will therefore provide about 16,000 cubic feet of gas.

Of course, it is not necessary to entirely fill the holds with pure carbon dioxide gas for fire extinctive purposes; air containing 25 per cent. of carbon dioxide has an oxygen content of 15·7 per cent., and ordinary substances will no longer burn in it. Reckoning in this way a hold of 60,000 cubic feet capacity would be rendered fire extinctive in two hours by using the contents of fifty cylinders of gas, supposing two cylinders to be connected to the steam supply and delivery pipes at any one time.

Of course, dilution can only be effective if the gas and air are thoroughly mixed. As the carbon dioxide gas is much heavier than air, most of it goes to the bottom and diffuses with the contained air. The safest plan is to put in such a volume of gas that the whole or nearly the whole of the contained air is expelled through vents left open for the purpose.

In June, 1908, a test of the Gronwald system was made at Marseilles. For the purpose the Société Générale de Transports Maritime, which had already fitted four of their steamers, placed their steamer *Les Andes*, 3,974 registered tons, at the disposal of the Committee.

The focus of the fire consisted of bales and bags of rags, manilla rope, greasy oakum, cotton, paper, copra oil cake, jute, empty oil barrels, wood and straw, which were covered with 9 tons of coal.

At 9.20 a.m. the fire was lighted and allowed to burn for about one hour, after which time the temperature had risen to 356 degrees Fahrenheit and the paint on the outside of the ship became puffy and thick pieces fell off. Water, poured on the plates, vaporized immediately.

At 10 a.m. order was given to start the "Gronwald" apparatus. The ventilator and the hatch were rapidly closed and within two minutes from the time the order was given, the "Gronwald" apparatus was at work. The following temperatures were then recorded:—

10.17	:	forward	302 deg. Fahr.	aft.	212 deg. Fahr.	
10.22	:	,,	257 ,,	,,	204	,,
10.25	:	,,	221 ,,	,,	182	,,
10.40	:	,,	186 ,,	,,	140	,,
11.00	:	,,	168 ,,	,,	122	,,

Within forty-five minutes the temperature was reduced by 221 degrees, and the apparatus was then stopped; 615 lbs. of carbon dioxide had been used.

The following is from an official report of the Fire Brigade at Kiel recording some parallel fire-extinguishing tests carried out on board S.M.S. *Sachsen*, in May, 1910. The hold measured 50 cubic metres (1,750 cubic feet) and the material consisted of 21 cwts. of coal, which had been brought into a state of a white hot glowing mass, half a bale of peat, soaked with paraffin oil and placed on a pile of wood, red hot coke in an iron basket, two candles and one lighted benzine lamp.

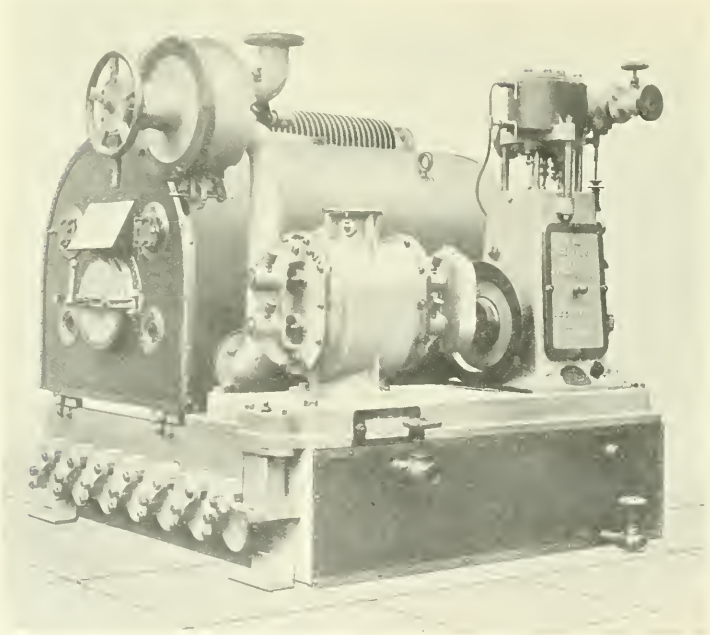
1. *Steam.* After injecting steam under a pressure of 105 lbs. per sq. inch for two hours, the steam was turned off and after another three hours the hold could be entered, the temperature having been reduced to 54° Cent. The fires were found to be extinguished.

2. *Carbon Dioxide.* During a period of thirteen minutes forty kgs. (that is 88 lbs. or 704 cubic feet) of gas were injected. The temperature was reduced by 21° Centigrade. From the closing of the hold for extingnishing the fire one hour and thirteen minutes elapsed before the hold could be entered, and the temperature was then only 24° Centigrade. The fires were properly extinguished and the coal had resumed the temperature of the hold.

3. *Hermetically closing the hold.* The hold was closed for two hours and the fire left to extinguish itself. The result was a negative one, the fire in the coke as well as in the coal pile was still burning briskly.

On 21st of May further tests were made to see whether it was possible to extinguish a fire under the same conditions as on the previous days, but within a period of thirty minutes.

Carbon Dioxide. After closing the hold, gas was injected for thirteen minutes and the hold was opened after another seventeen minutes. It required five minutes' ventilation before the hold could be entered, and it was then ascertained that the coal and peat fires were extinguished. The coke in the iron basket was extinguished to the extent of two-thirds.



The Clayton Machine for Sulphur Dioxide Gas.
Fig. 3.

Steam. After injecting steam under a pressure of 110 lbs. per square inch, for half an hour the fires in the coal pile and the coke were still well alight, but the fire in the peat was extinguished.

Hermetically closed. The hold was closed hermetically for thirty minutes, and after opening it, the fires were still burning. They had to be extinguished by water.

Attention may be drawn to the fact that in both tests the amount of carbon dioxide gas used was about 40 per cent. of the capacity of the small hold employed. To fill a hold of 60,000 cubic feet to the same fire extinctive degree, the contents of eighty cylinders would be required.

The Gronwald carbon dioxide apparatus has been fitted to seventy vessels, including

Valdivia ..	7,500	Soc. Génér. de Transports à Vap., Marseilles.
Waimana ..	8,000	Shaw, Savill & Albion Co., Ltd., London.
Makarini ..	10,500	Tyser Line Ltd., London.
Vauban	11,000	Lamport & Holt, Ltd., Liverpool.
Ve	11,500	Lamport & Holt, Ltd., Liverpool.

Sulphur Dioxide Gas.

In the Clayton system sulphur is burned in a generator, and the products of combustion are cooled and then forced through pipes into the ship's holds. According to a Local Government Board report, the composition of the gas averages about 10·5 per cent. of sulphur dioxide, 80·5 per cent. of nitrogen, and about 9·0 per cent. of oxygen.

According to these figures, a ton of sulphur will produce about 180,000 cubic feet of gas.

The machine generally used for steamships measures 5 ft. 8 in. by 4 ft. 10 in., is 4 ft. 8 in. high and weighs 33 cwt.

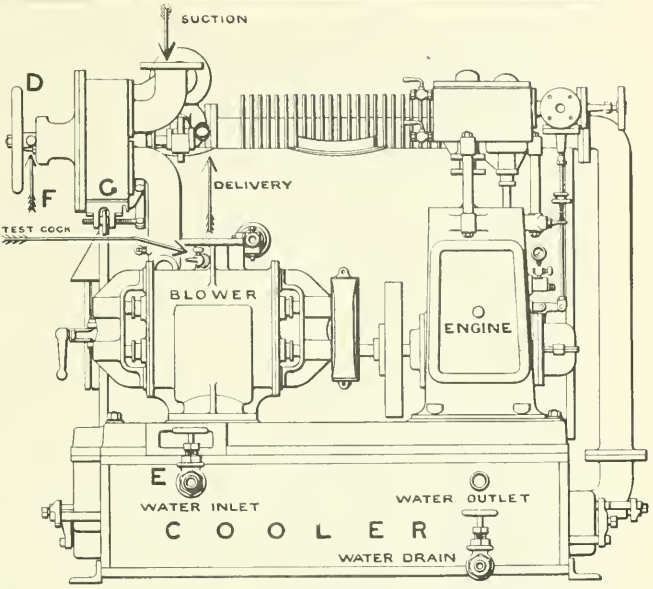
It is illustrated in Figs. 3, 4 and 5.

The generator is charged with ordinary roll sulphur, and when gas is required a handful of cotton waste saturated with methylated spirit is placed on the sulphur, and ignited. The generator door (B) is closed after first starting the engine (C), which drives the blower. Air is drawn into the generator through a suction pipe which connects with the upper part of the hold or compartment to be treated. The air thus extracted passes into the generator, where the oxygen combining with the burning sulphur forms a fire extinguishing and germicidal gas, which passes ont through the cooler to the blower. It is then forced through the delivery pipe leading into the lower part of the hold or compartment to be treated. The fire is thus deprived of the oxygen necessary for its support, and such oxygen is replaced by sulphur dioxide gas.

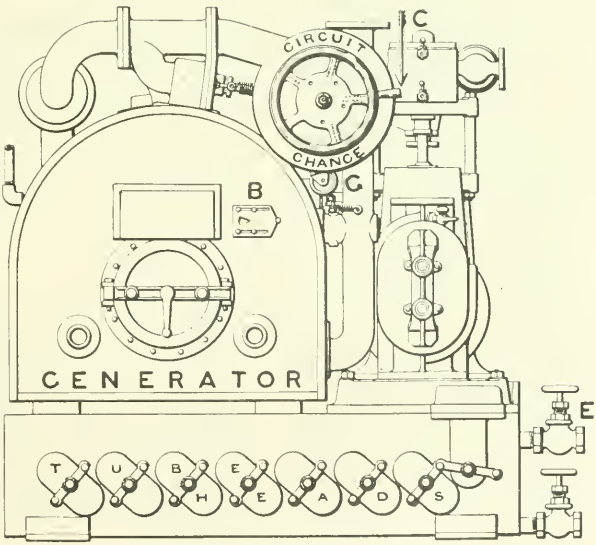
Of course, before it can be passed into the holds, the sulphur dioxide gas has to be cooled to a little above normal air temperature.

Fig. 6 shows four sectional views of the machine with arrows indicating the direction of flow of the gas through the apparatus.

It might be thought that by so cooling, some of the sulphur would be deposited as flowers of sulphur, but such is not the case so long as the percentage of sulphur dioxide in the mixture does not exceed about 20 per cent. The latest machines are fitted with an automatic control to keep the gas below that percentage.



Side View of the Clayton Machine.
Fig 4



End View of the Clayton Machine
Fig. 5.

It is believed that besides the sulphur dioxide a certain amount of sulphur trioxide is present, and it is this which gives the gas a brown yellow tinge.

Sulphur dioxide is very pungent and makes itself evident by affecting both the eyes and the nose, also it is visible. In one case of a boat being fumigated at Dunkirk, a seaman who had been paid off returned to the ship unknown to the authorities and was asleep in his bunk when the gas was turned on. Its pungency awakened him, and he was able to make his escape whereas with a less pungent gas he might have slept on and have been asphyxiated.

The system differs from others in having both delivery and suction pipes connecting the apparatus and the holds. A powerful blower delivers sulphur dioxide gas to the bottom of the hold and draws air from the top of it, the volume withdrawn being about equal to that delivered. This is done not only to secure penetration of gas but to economise sulphur.

One objection urged against sulphur dioxide is that it attacks the metal work and spoils some kinds of cargo. The following extracts from report by Prof. Wyndham R. Dunstan, F.R.S., and Dr. J. Wade bear on this matter.

ABSTRACT FROM PROF. WYNDHAM R. DUNSTAN'S REPORT.

"Sulphur dioxide is slightly absorbed by petroleum, more so if the gas is forced through the liquid than if merely in contact with the surface. The liquid is, however, little if at all changed by the solution of the gas in it. Vegetable oils (*e.g.*, olive oil and linseed oil) absorb sulphur dioxide, becoming brown and gradually forming black deposits. It is, therefore, not safe to expose vegetable oils to air containing sulphur dioxide.

"Sulphur dioxide when present in air to the extent of 15 to 20 per cent. has little or no effect on dry fabrics. Coloured materials are not usually affected unless moist, and in this case bleaching occurs to an extent depending on the nature of the dye. Coloured silks of various shades, coloured cotton and flannels, have been kept for five hours in an atmosphere containing 15 per cent. of SO_2 without being appreciably affected.

"Dry air containing sulphur dioxide has little or no action on dry metals, but if the atmosphere is moist a superficial corrosion occurs with such metals as iron, steel and copper.

"In order to ascertain the fire-extinguishing properties of SO_2 mixed with air, a number of experiments have been made with ordinary air containing different proportions of the gas, a lighted taper being used as an example of a rapidly-burning material. The results show that in the presence of 7 per cent. of SO_2 the flame was at once considerably diminished and ultimately extinguished; with 8 per cent. it was instantly extinguished.

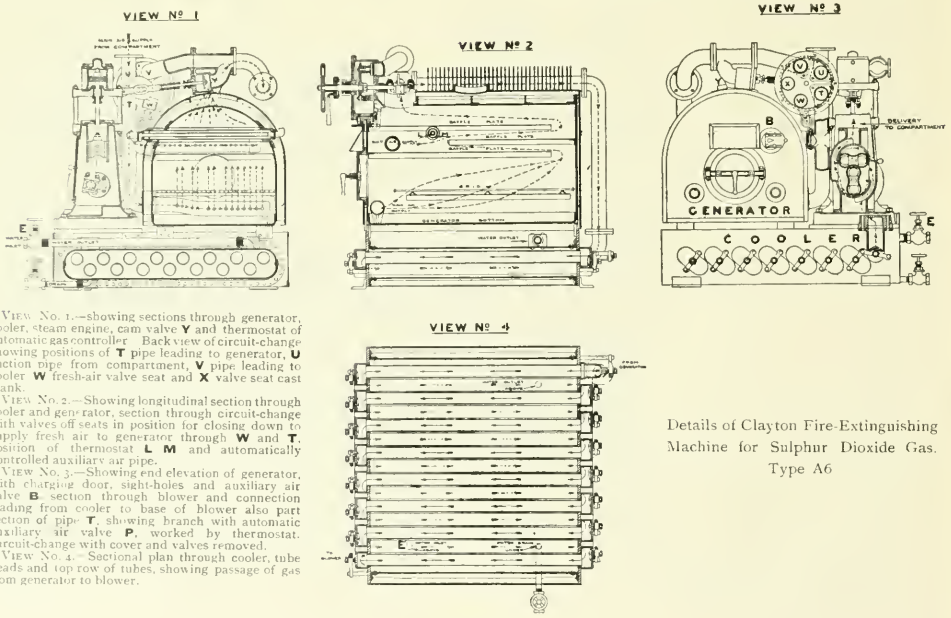
ABSTRACT FROM DR. J. WADE'S REPORT.

"Textile fibres and fabrics, metals and furniture are not affected by sulphur dioxide, but are liable to injury by the accompanying sulphuric acid, when the gas is produced by burning sulphur, unless they are protected by means of a suitable covering. Jute in bales is not affected in any case.

"Moist food-stuffs, such as fruit, vegetables and fresh meat, are uneatable after exposure to sulphur dioxide, and wheat in bags is rendered useless for bread-making; but owing to the slowness of penetration wheat in bulk is not seriously affected. Barley and maize are practically unaffected by fumigation with sulphur dioxide.

"Sulphur dioxide is quickly detected by its pungent odour. The importance of supplying the gas in considerable quantities for the purpose of fire extinction has been well pointed out by Mr. George Canning in a paper on 'Fire on Shipboard,' which he read before the Junior Institution of Engineers vol. 14. p. 27.

"It is a comparatively easy matter to extinguish a fire in an enclosed compartment by the introduction of gases, but it must be borne in mind that the temperature of that compartment has not been decreased to any appreciable extent during the process. It is, therefore, a practical certainty that unless a system embodies adequate arrangements for carrying off the surplus heat failure is sure to follow."



VIEW No. 1.—showing sections through generator, cooler, steam engine, cam valve **Y** and thermostat of automatic gas controller. Back view of circuit-change showing positions of **T** pipe leading to generator, **U** suction pipe from compartment, **V** pipe leading to cooler **W** fresh-air valve seat and **X** valve seat cast blank.

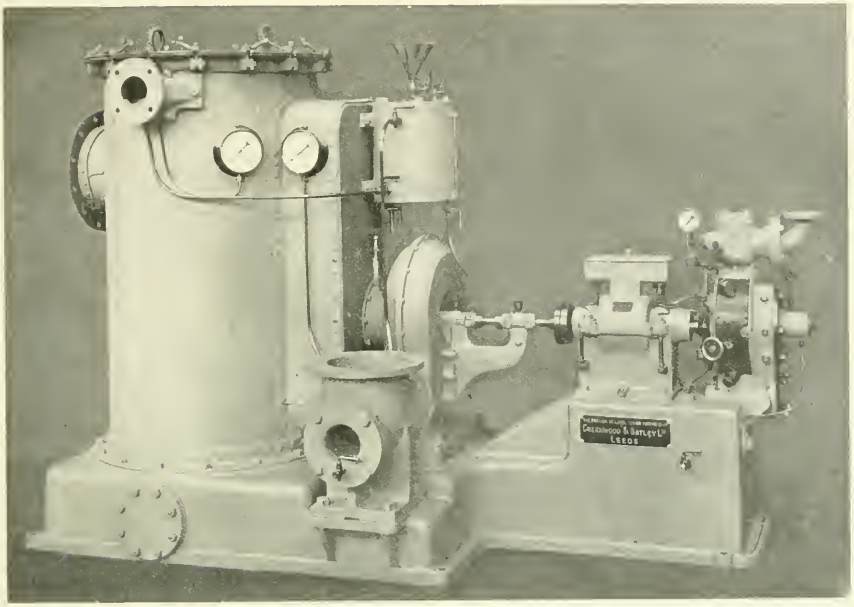
VIEW No. 2.—Showing longitudinal section through cooler and generator, section through circuit-change with valves off seats in position for closing down to supply fresh air to generator through **W** and **T**, position of thermostat **L M** and automatically controlled auxiliary air pipe.

VIEW No. 3.—Showing end elevation of generator, with charging door, sight-holes and auxiliary air valve **B**, section through blower and connection leading from cooler to base of blower also part section of pipe **T**, showing branch with automatic auxiliary air valve **P**, worked by thermostat. Circuit-change with cover and valves removed.

VIEW No. 4.—Sectional plan through cooler, tube heads and top row of tubes, showing passage of gas from generator to blower.

Details of Clayton Fire-Extinguishing Machine for Sulphur Dioxide Gas. Type A6

Fig 6.



The Harker Machine for Flue Gas.
Fig. 7.

Over 200 steamships and twenty sailing vessels have been fitted with the sulphur dioxide system, the steamships including such vessels as

	Tons	
Royal George	10,000	Canadian Northern S.S. Co.
Royal Edward	10,000	,, ,, ,,
Chujo Maru	13,500	Japanese S.S. Co.
Manchuria	13,639	Pacific Mail S.S. Co.
Mongolia	13,639	,, ,, ,,
Nieuw Amsterdam..	16,967	Holland-Amerika Sign.
Washington	17,500	Norddeutscher Lloyd.
Minas Geraes	20,000	Brazilian battleship.
Sao Paulo	20,000	,, ,,
Dakota	21,000	G.N.S.S. Co., St. Paul.
Minnesota	21,000	,, ,,
Amerika	25,000	Hamburg-Amerika Line.

Sulphur dioxide has been introduced into holds to prevent spontaneous combustion of coal cargoes, but as the gas is readily absorbed by moisture, forming an acid, it would not be suitable for any but a very dry coal.

The Flue Gas System.

An ordinary fire receives its supply of oxygen from the air, of which this gas forms 21 per cent. When the oxygen content is reduced to about 15 per cent. the combustion of ordinary substances ceases, as previously pointed out. When coal is burnt in a normal boiler a large part of the oxygen of the air combines with the coal and the resulting flue gas only contains about 9 per cent. of oxygen. It will thus be seen that flue gas is quite unable to support combustion and it is the gas which is used in the system due to Mr. G. Harker, D.Sc. Being waste gas it costs nothing, but before turning it into the hold it has to be cleaned and cooled. A typical analysis of flue gas is as follows :—

Nitrogen	80·5 per cent.
Carbon dioxide	10·0 ,,
Carbonic oxide	·5 ,,
Oxygen	9·0 ,,

Fig. 7 shows the general appearance and Fig. 8 indicates the details of the Harker apparatus. A is a De Laval turbine driving the fan B, but of course an electric motor could be used instead of the turbine. A branch pipe C connects to the main funnel from the boilers or to the funnel of the donkey boiler, and it conducts the gas to the washer and cooler D. After being washed the gas passes to the fan and by it is delivered to the gas main through E. Seawater is pumped into the washer at F, and is formed into a fine spray, which takes out the soot as the gas passes on its way to the fan. At G there is a branch opening to the atmosphere, which is used when ventilating the holds. Disinfectants can be drawn from tank J in a vaporized condition and carried along with the gas to all parts of the ship.

In addition to a connection with the base of the funnel the machine must be connected with the uptake of the donkey boiler, so that gas can be drawn from it when the vessel is in port, or at any time the main boilers are not in use. A donkey boiler of ordinary size is quite capable of supplying a sufficient quantity of gas. This has been proved by actual trial, but as there is not a large body of gas passing up its funnel, it is necessary to provide a damper, so that when the apparatus is working, atmospheric air may be prevented from coming down the donkey boiler funnel.

Fig. 9 gives sectional views of the latest type of scrubber and cooler. The arrows indicate the direction of flow of the gas and of the water.

The washing is effected in the following way. The gases pass downwards through a nest of six-sided cast-iron pipes (cast iron being chosen to prevent erosion), water also passes down at the same time, but at a quicker rate, so that an ejector effect is set up which reduces the suction head of the fan. The velocity of the gas is about 50 ft. a second and of the water about 120 ft. a second. As the water shoots through the gas it picks up the soot particles and they run off with the water at the bottom. The gas then returns to the top of the washer by a circular path, the whirl of which throws out more water and it then passes to the fan clean. About

3,000 gallons of water per hour are required to cool down 90,000 cubic feet of gas per hour to a temperature of 120° Fah.

Under good working conditions 1 lb. of coal requires about 18 lb. of air a quantity which at ordinary temperature and pressure occupies about 196 cubic feet. During combustion most of the oxygen combines with the carbon of the coal and is converted into carbon dioxide gas, which, when cooled occupies exactly the same volume as the original oxygen consumed. Hence about 450,000 cubic feet of flue gas are produced by burning one ton of coal.

The fan delivers into a 6 in. diameter galvanized steel riveted pipe which runs fore and aft (see Fig. 10). Branch pipes controlled by sluice valves lead down to the bottom of the holds and bunkers, and at the lower end of each of these branch pipes there is a specially constructed rose having 1-inch holes, which prevents the cargo getting into the pipe, but allows free escape of gas. Branches are led on deck to a hose coupling for disinfecting and fumigating the passengers' and crews' quarters. The inlet branches are so arranged that the air or gas in the holds will be displaced as rapidly as possible. If necessary the main pipe can be led through the ballast tanks or along the bilge, the valve handles being extended through protecting casings to the main deck (see Fig. 11).

When a fire breaks out the boiler fires are kept thick and well supplied with coal, and if Howden's forced draught is fitted, the valves supplying the air to the top of the fires are closed. The ventilators are closed and one of the hatch covers furthest away from the inlet pipe is partly opened so as to allow air to escape. The time required for filling a hold depends on its capacity, but knowing what that is, it can be easily calculated, making sufficient allowance for leakage.

Flue gas from oil fuel acts in a similar manner to that from coal. The exhaust from internal combustion engines may also be used, and will require less cleaning than flue gases. As it is probable that within a very few years a large number of vessels will be propelled by internal combustion engines, this is an important point. Such exhaust gases would contain very little oxygen, and be therefore very effective for fire extinguishing purposes.

One objection that has been urged against the Harker system is that the flue gas might contain sufficient carbon mon-oxide to form an explosive mixture with the air in a hold. Dr. Harker's rejoinder to that is that if such a liability to explode exists, it ought to show itself whenever a fireman opens the door of a boiler furnace and allows a rush of air to mix with the supposed inflammable gases. Yet it is common knowledge that nothing of the kind ever happens. Experiment has shown that not less than 16 per cent. of carbon monoxide must be present in the mixture with the air before explosion is possible, while in ordinary experience the proportion in flue gas never reaches even 5 per cent., and is very rarely over 1·5 per cent. In good combustion it is absent altogether. Flue gas is incapable of exploding when mixed with any proportion of air whatever. It has been so largely deprived of oxygen and contains so much inert gas—nitrogen and carbon dioxide—that it may be used to dilute a mixture of explosive gases and prevent ignition.

The best answer to the criticism is that in carrying out fumigation work with the Harker system, flue gas has now been pumped into a large number of steamships, and in all cases the penetration of gas into the various parts has been indicated by causing the gas to extinguish lighted lamps.

In America the Harker system has been investigated by a specially appointed Naval Board and passed through all the tests applied.

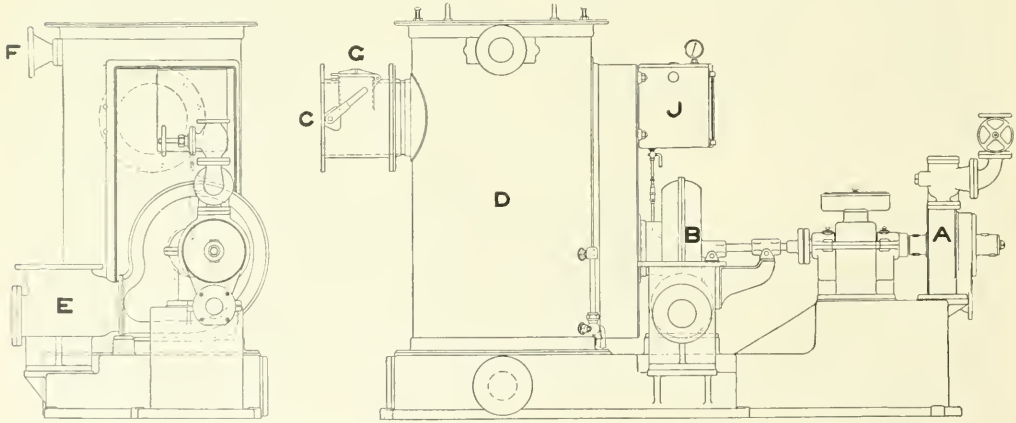
In one test carried out at Mare Island Naval Yard, the flue gases were drawn from the uptake of two boilers burning oil. A quantity of crude oil was placed in a tank and set on fire. When the oil was burning with great force, the machine was started, drawing flue gas from the uptake of the boilers through the washer. This gas was blown into the tank over the burning oil by a fan, and the flames were almost instantly extinguished. It was also shown that the gas generated from the hot oil could not be exploded with the flue gas as an atmosphere.*

Comparisons of Various Systems.

The flue gas system undoubtedly stands first in *effectiveness of operation*, because the gas can be delivered into the holds at a much greater rate and the supply kept up for a longer period than the gases used in other systems. A pure CO_2 gas supply is naturally limited to the amount carried in the steel bottles, and SO_2 gas supply is limited by the amount of raw sulphur available, the rate at which it can be burned, and also by its speed of travel in a complicated piping system.

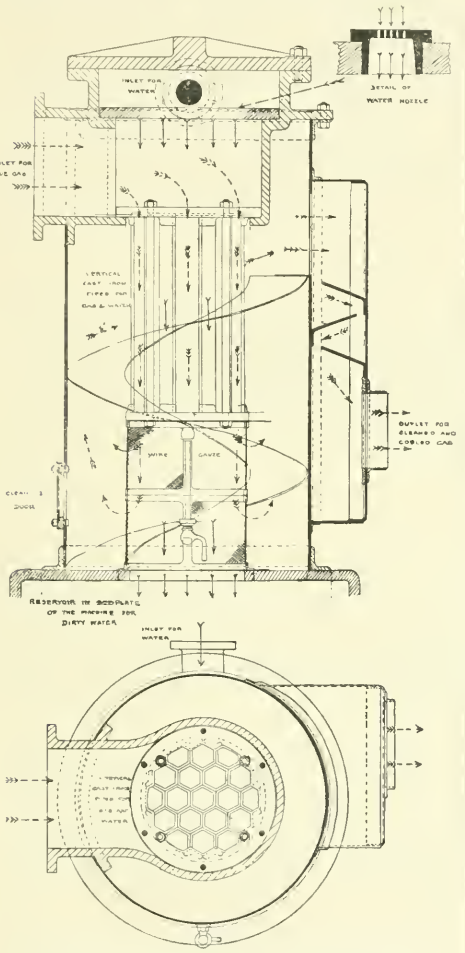
There is an important point in this connection, namely, that however well the hatches and ventilators are closed, there is always considerable leakage. For example, at the trials of the s.s. *Fiona*, fitted with the Harker system, it was found that about 500 cubic feet of gas per minute were necessary to maintain a fire extinctive atmosphere in a large hold of 80,000 cubic feet capacity. When the hold is filled

*The question of protecting buildings containing inflammable materials, especially such as paint, cotton, oil cake, etc., is very important. Probably a feasible system could be worked out whereby the windows of any floor of a factory or warehouse could be automatically closed by iron shutters in case of fire and the floor filled with gas. It would be much the same as the sprinkler system, except that an inert gas would be turned on instead of water. It is just possible that such a system might work without automatic window shutters, because the whole essence of successful fire prevention is to suppress the fire before it has reached so dangerous a stage as to break the windows.



End and Side Elevations of the Harker Machine.
Fig. 8.

with gas and the fire under control, it may take several hours before the cargo is sufficiently cooled down to prevent a recurrence of the outbreak. Therefore a current of gas must be kept up so as to carry away the heat from the smouldering mass, and at the same time prevent the inlet of air. If the gas does not reach the burning cargo in sufficient quantity to carry away the heat from the glowing mass, but simply fills up the hold, the effect is the same as


INLET FOR WATER
DETAIL OF WATER NOZZLE
INLET FOR FLUE GAS
VERTICAL CAST IRON PIPES FOR GAS & WATER
OUTLET FOR CLEANED AND COOLED GAS
WIRE GAUZE
CLEAN-OUT DOOR
RESERVOIR IN BOTTOM OF THE MACHINE FOR DIRTY WATER
INLET FOR WATER

Details of Combined Scrubber and Cooler of Harker Fire-Extinguishing Machine using Flue Gas.

Fig. 9.

if the hatches were shut down, except that the flames disappear more quickly. In all probability, however, the fire will break out again when the hatch covers are removed. Although no flames are visible, the centre of the burning cargo may be still aglow. The heat from this smouldering mass must be carried away before it is safe to admit air to the hold, and the passage of large volumes of cool extinctive gas is the most effective way. It is this ability to pour any quantity of gas into the hold that makes the Harker system so valuable.

It may be of interest to give the relative densities of the gases. Taking air as unity, pure CO_2 is 1·54; pure SO_2 is 2·2; Clayton gas is 1·12, whilst flue-gas is only 1·05, or only slightly heavier than air.

The Rich system is the least effective, because of the liability of the steam to condense and to the fact that the steam is wanted for propulsion purposes.

In *promptness of getting to work* there is not much to choose between the four systems. With steam it is merely a matter of connecting up a hose pipe and turning on the steam. The CO_2 gas can also be turned on quickly, but there is the steam and water supply to adjust to prevent snowing up of the discharge openings.

Flue gas is always ready and all that is required is to start a fan and turn on water to the washer. The SO_2 gas system is perhaps the least prompt of the four, because the sulphur has to be lighted up.

There is no *damage to cargo or hull*, with either of the systems making use of CO_2 gas, namely, Gronwald's or Harker's. Sulphur dioxide gas and steam, are distinctly objectionable from this point of view.

To compare *cost of installation* the only way is to compare on the quantity of gas delivered into the holds. All the Harker machines, for example, are built to deliver 1,500 cubic feet of flue gas per minute, and for an ordinary sized cargo boat this will require, say, 7 h.p., and the apparatus will cost about £350. A similar sum would probably be required for the 4-in. and 6-in. diameter piping connecting to the various holds.

A Clayton machine costing about the same delivers only one-fifth of the amount of gas or less per minute, and it is conveyed to the holds through a system of piping, both lead and return, 2½ to 3 in. diameter. Although this piping is smaller there is twice as much of it and the cost of erection would probably be about the same.

In the CO_2 system pipes only ¾-inch diameter are employed, but steam-heating apparatus is provided to liberate the gas from the cylinders in reasonable time. The cost of the piping and two sets of apparatus for heating cylinders can be set down at something over £200. To this must be added the cost of the cylinders. Each cylinder, holding about 40 lbs. of compressed gas and weighing about 1½ cwts., costs £3, and delivers approximately 320 cubic feet of gas in about five minutes, so that an installation with two heating units would deliver say 130 cubic feet of gas per minute. 100 cylinders would cost £300, and deliver 32,000 cubic feet of gas.

The *cost of working* is very much less with the flue gas system than with any other because the gas is a waste product, whereas both the CO_2 and SO_2 gas cost a good deal to make. As the hold capacity of even a moderate-sized vessel may be 300,000 cubic feet, it will be seen that a very large number of bottles of compressed CO_2 gas and several tons of sulphur would be required to fill such a space with gas, let alone to make up for the leakages which would occur.

It is important to remember that SO_2 gas is very readily absorbed by cargo and moisture because of its chemical activity, consequently, in addition to leakage, heavy absorption losses have to be made up. As against this there is practically no absorption of CO_2 or flue gas. Much depends on the cargo; wool, for example, will absorb SO_2 readily, but jute or cotton, being largely composed of cellulose, do not absorb gas readily.

PART II.

FUMIGATION.

The inert gases that have been referred to would be almost as effective against animal life as they are against fire. Sulphur dioxide gas is a good fumigator, but it is such an easy matter to inject any kind of disinfectant into any of the gases that there is practically nothing to choose between the systems from that point of view.

Sulphur Dioxide Gas.

The Port of London Sanitary Authority have a Clayton disinfecting plant, which gives 60,000 cubic feet of disinfecting gas per hour. It is mounted on a barge 63 feet long and 14 feet beam, and the barge is towed alongside the steamers to be fumigated.

The writer believes he is right in saying that London is the only port in the British Isles which possesses an up-to-date equipment for preventing the introduction of bubonic and pneumonic plagues, cholera, small-pox, beri-beri, etc. All other ports appear to depend on men ratcatchers or other antiquated methods.

We are so accustomed to consider this country as specially immune from these particular diseases, on account of our cold climate, that it is worth pointing out that one of the most severe epidemics of pneumonic plague known in history occurred in Manchuria two years ago whilst the snow lay deep on the ground.

In 1905 and 1906 very exhaustive experiments were carried out for the Local Government Board by Mr. J. Wade, D.Sc., with the object of discovering whether sufficient penetration of SO_2 gas could be obtained in the laden holds of ships to thoroughly disinfect the cargo. For this purpose a model ship's hold, stowed with a general cargo, was used; means were taken to enable samples of gas to be drawn from any part for analysis, whilst rats and bacterial cultures were inserted to demonstrate thoroughly the action of the gas. Cultures, dried on paper and enclosed in glass tubes, as well as cultures planted in agar, were used, and over 1,100 tests of gas were made. The results were embodied in a report (No. 232), from which the following is abstracted:—

"Rats and insects would be destroyed in less than two hours by the uniform diffusion of at most 0·5 per cent. of sulphur dioxide. This condition is easily and quickly realized in cabins and empty holds, and in the space around the cargo in a loaded hold; but owing to the extensive absorption of this gas, air containing 3 per cent. of it must be circulated around the cargo for 8 to 12 hours to ensure adequate penetration.

"Pathogenic bacteria in exposed places would also be destroyed by the above treatment, and if the hold be closed for a like period afterwards, sufficient penetration will have taken place to ensure the disinfection of all those parts of the interior of the cargo in which these bacteria are likely to be present. Complete penetration can in extreme cases be secured by repeating the fumigation without opening the hatches."

Pictolin Gas.

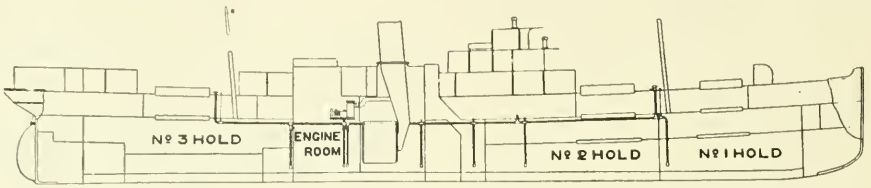
The Gronwald system has also been developed for disinfecting purposes under the name of the Pictolin fumigator. It is given the name Pictolin because the gas used, namely, a mixture of carbon dioxide and sulphur dioxide was first suggested by Professor Pictet. The mixed gas is liquefied and stored in steel bottles just the same as the gas used for fire-extinguishing purposes.

The standard equipment for the Pictolin process consists of two steel cylinders, each containing 50 kilogrammes of Pictolin gas. The outlet valves are connected with the heaters by means of a brass pipe. Every standard installation comprises fifteen filled steel cylinders, two heaters working independently of each other. The heating can be effected by steam or hot water. There is also a fan capable of dealing with 80,000 cubic feet of air per hour. This is for freeing the hold of the gas when the disinfecting is finished.

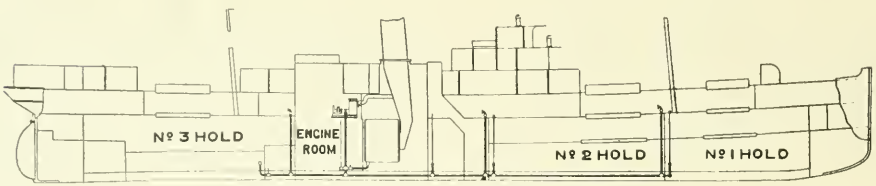
Dr. Nocht, port physician of Hamburg, carried out trials with Pictolin gas, as a result of which the gas was sanctioned by Government in place of sulphur fumigation for the destruction of rats on ships in the harbour.

The following is an extract from his report:—

"I beg to inform you that the trials, carried out under my supervision on board ships with Pictolin for the purpose of destroying rats in holds have proved satisfactory. After three hours exposure of not less than two kilos of gas in a space of 100 cubic metres, the gas being properly distributed



Piping for the Flue Gas System
Fig. 10.



Main Piping for Flue Gas carried along the Bilge.
Fig. 11.

by means of the distributor provided by Dr. Altschul, all animals brought into the space for the purpose of the experiment were killed, including those in cages placed in remote corners and angles and other parts difficult of access.

"I can therefore, as a safeguard against disease, thoroughly recommend the remedy, partly on account of the shortness of time required to destroy the rats, and partly on account of the total absence of fire risk in destroying rats in ships' holds."

Flue Gas.

The flue gas as used in the Harker system, consisting as it does principally of carbon dioxide and nitrogen, is in itself an admirable raticide. It will not kill germ or insect life, but by introducing formaldehyde or carbon bisulphide there is no difficulty in making it kill anything to be met with on a steamer.

A Harker machine installed on a small steamer in Sydney Harbour has been successfully employed for the fumigation of ships in accordance with the official quarantine regulations of the Australian Government, after first passing rigid Government tests. In this case the gas taken from the funnel of the steamer was carried to the holds of the ship to be fumigated by means of flexible hosing.

The following are extracts from the report of Mr. Wm. H

Hamlet, F.I.C., analyst to the Government of New South Wales.

"The fumigation tests were carried out in the hold of a lighter of about 6,500 cubic feet capacity, with a large hatchway that could be closed in, and also in two smaller hold spaces with separate hatchways and apertures connecting with the main hold.

"The inlet gas pipe was led into a corner of the main hatch, a tarpaulin covering it when fixed into position, the outlet for air being controlled at each end.

"The gases were driven into the hold of the lighter by means of a steam turbine, which was set going at full speed for a period of ten minutes. 'Harker' gas impregnated with the vapour of bisulphide of carbon was pumped in, then 2¼ gallons of the liquid was volatilized and pumped in during eight minutes, so that the total time of pumping was eighteen minutes. As the gas overflowed from the hatchways, the distinct and characteristic odour of carbon bisulphide became unpleasantly apparent, and after eight minutes I caused a naked light to be lowered. The result was that the light was instantly extinguished and there was no explosion, thus proving the absence of danger with the quantity of liquid used. The quantity of bisulphide used in the experiment was 2¼ gallons for 6,500 cubic feet, or in the proportion of 66 oz. by weight per thousand feet of the space fumigated. The quantity is not explosive, but I regard it as excessive in view of its verminicidal properties. At this state of the fumigation, when the hold was fully charged with 'Harker' gas, together with vapour of bisulphide, a cage containing a live rat was lowered down into the hold and raised. After the expiration of two minutes the rat was still living. On immersion for a further two minutes the rat was found to be quite dead, showing that four minutes' exposure was sufficient to kill rats; also most of the fleas on the rat were dead. All the cockroaches died in fourteen minutes.

Butter and flour, which had been placed in the hold, were found on examination to be free from taint or discoloration, and were not rendered unfit for consumption, but the butter had melted. The writer understands that, since these tests, the apparatus for cooling the gas has been much improved.

The gas gave the following analysis:—

Nitrogen	78·7	per cent.
Carbon dioxide	11·0	,,
Carbonic oxide	1·2	,,
Oxygen	8·4	,,
Carbon bisulphide	0·7	,,

Tests have also been made at the Mare Island Navy Yard, Washington, under direction of a board consisting of an engineer officer, a naval constructor, the yard chemist, and the doctor in charge of the naval hospital. Besides fire being extinguished and explosion of oil vapour prevented, rats were destroyed in a few minutes, and it was further shown that disease germs were killed by charging the gas with formaldehyde vapour. For this purpose 180 cubic centimetres of formalin were used for every thousand cubic feet of flue gas.

The *W. D. Bratton* of the United States Marine Hospital Service has been fitted with the Harker apparatus and is being used regularly to fumigate all vessels coming into Philadelphia from West Indian and foreign ports.

The gas comes from the funnel of the vessel, which burns in the boiler a mixture of coal and coke. The plant has proved so satisfactory and economical, and the gas has been found so admirable a raticide and yet harmless to cargo, that the United States are now calling for two further Harker machines, which will be used at other American ports. The shipowners are especially pleased with the system, because the gas can be introduced into the saloons without doing any damage or leaving any odour.

A small quantity (about ¼-lb. per 1,000 cubic feet) of carbon bisulphide, or mustard oil, is added to the gas continuously in order to give it a distinctive smell. Investigation has shown that the quantity of carbon bisulphide necessary for insect destruction is 2 lbs. per 1,000 cubic feet, but for plague rat fumigation this is not used.

The hosing for leading the gas to the vessel being fumigated is made of spiral phosphor-bronze wire, covered with canvas. It is probable that such light piping would be quickly destroyed by a corrosive gas, such, for example, as sulphur dioxide.

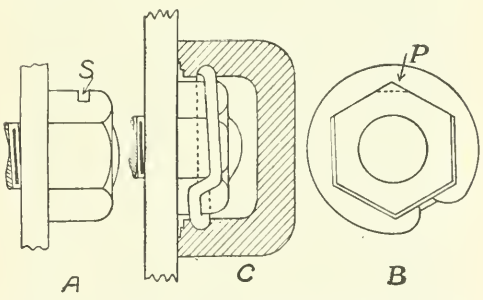
Experiments carried out recently at the Lister Institute in London have shown that the vapour of carbolic acid in small percentage will destroy fleas and bed bugs, and it is quite probable that the chemical will prove a valuable substitute for carbon bisulphide.

In a series of experiments carried out in connection with Plague investigation in India (see *Journal of Hygiene*, vol. vi., 1906, pp. 467-482), it was found that ordinary processes of disinfection did not destroy plague fleas. The walls and floors of infected houses were washed with an acid solution of perchloride of mercury and the rooms fumigated with burning sulphur without any effect.

In conclusion, it may be said that there are available at the present time several methods of using gas for purposes of fire extinction and fumigation on ship. Information as to the properties of the various gases employed has been given, as well as particulars relating to costs of installation and upkeep. Compared with the risk of human life and property, the cost of a gas plant is small, and now that so much attention is being given to the safety of life on ships, authorities should insist on every vessel carrying an up-to-date plant for fire extinction. Also, every port should have an efficient apparatus for fumigation of ships arriving from infected areas. Instead of being in the van in this respect, this country lags behind, and many authorities believe that we shall have a very rude awakening some day. It is not true that for climatic reasons this country is immune.

"ÆGIS" PATENT COMBUSTION CHAMBER STAY-NUT PROTECTOR.

IN boilers where the combustion chambers are somewhat contracted, the stay ends and nuts suffer from the abnormal conditions, and require frequent renewal. The same trouble is experienced where certain classes of coal are supplied, even when the design of the boilers is well-proportioned to the work they have to do. The "bird-nesting" in the back ends of the tubes or the crusting of sediment on the landings, stays and bridge plates is not only detrimental to the steaming power of the boiler, but injurious to the whole structure. The stay-nut protector illustrated, to which our attention has been called, is made of carefully selected fire clay, seasonably coked and tested to stand



the action of the heat in the combustion chambers. It is fitted over the stay-nut, into which a slot is cut to receive a ring of malleable iron so made as to form a thread to grip the nut. The cover is formed with an internal thread of the same pitch, which enables the protector to be screwed up hard and fast against the boiler plate. Although the practice of protecting the stay-nut by means of a fire clay cover is not by any means new, yet the "Ægis" patent is certainly a decided improvement on all others hitherto brought to our notice, inasmuch as it is practically impossible for it to fall off.

Any further information that may be required will be gladly supplied by the Patentees, Messrs. Reginald Christie & Co., 5, Lloyd's Avenue, London, E.C.

INSTITUTE OF MARINE ENGINEERS.

THE twenty-second annual dinner of the Institute was held in the Connaught Rooms, Kingsway, London, W.C., on November 8th, when about 450 members and friends were present. Before proceeding to the large hall, a reception was held by the President. The guests included the Right Hon. Sir George H. Reid, P.C., G.C.M.G., Admiral the Hon. Sir E. R. Fremantle, G.C.B., Sir William H. White, K.C.B., F.R.S., D.Sc., Sir Walter J. Howell, K.C.B., Charles Booth, Junr., Esq., James Denny, Esq., Thomas L. Devitt, Esq., Captain H. Acton Blake, Dr. Wm. C. Unwin, E. B. Ellington, Esq., W. Duddell, Esq., F.R.S., J. Bell-White, Esq., Admiral Lindor Perez, Captain Kenji Ide, Colonel R. Saxton White, V.D., James H. Rosenthal, Esq., Dr. G. B. Hunter, J. Muysken, Esq., D'Arcy Dawes, Esq., Alexr. Boyle, Esq., Dr. S. J. P. Thearle, J. Foster King, Esq., John Gravell, Esq., Charles W. Gordon, Esq., H. Hunter, Esq., Leslie Skinner, Esq., A. E. Doxford, Esq., Harold R. Dixon, Esq., James Adamson, Esq. (Hon. Secretary), Professor R. L. Weighton, M.A., D.Sc., A. Scott, Esq., F. W. Sanderson, Esq., M.A., Geo. T. Henderson, Esq., J. M. Allan, Esq., George J. Carter, Esq., A. B. Gowan, Esq.

The Croupiers were W. G. Gibbons, Esq., J. E. Wimshurst, Esq., F. Putnam, Esq., J.P., Alex. H. Mather, Esq. (Hon. Treasurer); H. J. P. Beliard, Esq., Asplan Beldam, Esq., J. T. Milton, Esq., H. Walker, Esq., R. Leslie, Esq., R.N.R., W. J. Willett Bruce, Esq., R.N.R., George Adams, Esq., J. Howden Hume, Esq., and E. J. Dove, Esq., J.P.

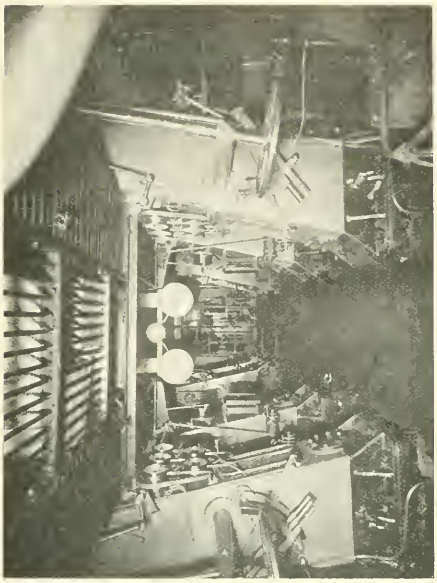
After the loyal toasts, "The Imperial Forces" was proposed by Mr. J. Bell-White (Master of The Worshipful Company of Shipwrights), in an interesting speech in which he pointed out the service rendered to their country by those who joined the army and navy, and when they had done their duty in these forces, it was fitting that employment should be given to them as far as possible.

Admiral Sir E. R. Fremantle responded on behalf of the Navy, and Col. R. Saxton White, V.D., on behalf of the Land Forces. Sir Wm. H. White, K.C.B., proposed "The Oversea Dominions, Ships and Commerce," pointing out that ships were first in the field to carry on commerce and discover the lands beyond the seas; but in view of the great importance of the Oversea Dominions at the present time, it was well to place them first. Each of the great units which formed the Oversea Dominions was forming plans for the common defence, and, by the union and loyalty of all, there would be united action to maintain the Empire. The Right Hon. Sir Geo. Reid, P.C., G.C.M.G., responded, and agreed that ships were necessary, and that the Navy should be kept in a high and efficient state to maintain the traditions of the past and to guard the heritage which had been left to this generation.

Mr. Thomas L. Devitt said he had the honour to propose the toast of "The Institute of Marine Engineers." He wanted to assure them that the shipowners of England valued very highly the services of the marine engineer. He was assured that the Institute was a very young body, but, like all important societies based on proper principles, it had grown quickly. About twenty-three years ago there were about twenty members, now over 1,300, and he would venture to say that the work done by the Institute had been of the greatest importance to the country. The British shipowner ought to know more about the engineer. Of course, no shipowner ought to be entirely without a knowledge of engines; he ought to know the different types of engines, and how best to take advantage of them, but much beyond that he had little opportunity of knowing; "the shoemaker must stick to his last," and shipowners could not do without the marine engineer, who was a most valuable asset to the country, and was most heartily and highly appreciated. The society they belonged to was a most useful one, they put out their theories in their papers and these were read and circulated over all the world, and read with the greatest interest. The Society over which he had the honour to preside, Lloyd's Register of Shipping, knows how the services of the engineers are counted upon. The Diesel engine was now coming into use, the combination of the reciprocating engine and the turbine, which had proved so valuable, and other new systems were all doing their best to keep the marine engineer in the foreground. He asked them to drink the toast of "The Institute of Marine Engineers," coupled with the name of the President, Mr. Summers Hunter.

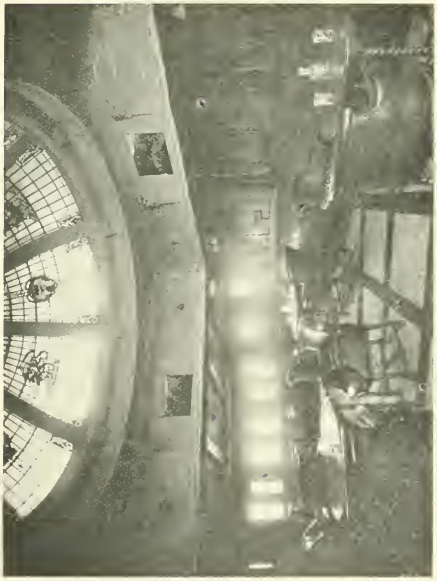
Mr. Summers Hunter, in responding to the toast, said:—Most of them would know, although the Institute of Marine Engineers was officially founded in 1889, that the initiation took place a few months earlier, but it was not until 1891 that the Institute was considered to have passed through the period of infantile ailments, for in that year the first dinner was held. The primary objects of the Institute were progressive advancement of the sea-going engineer, in all that pertains to the machinery, the fitting on board and the economic working of the machinery, the creating of greater facilities for self-culture, and the exercise of those faculties which tend to ennoble and elevate. This, he thought, was a most comprehensive charter, and was eminently practical and yet idealistic. This unusual combination was not to be wondered at, as the original founders were all practical men seeking to do good in their respective spheres, and particularly with regard to sea-going engineers. The papers read before the Institute were always of a high standard, and the discussions of a serious and educational nature. Many of the members were closely identified with the Royal Navy, and from time to time the names of chief constructors, chief engineers and members of the engineering *personnel* of the Navy, had been associated with the Institute, and, on behalf of the Institute, he wished to welcome again one of their oldest and most respected supporters—Sir William White, also Admiral Fremantle. This connection, through the medium of the Institute, between the engineer of the Royal Navy and his brother of the Mercantile Navy, was important, and of more than passing significance. The sea-going engineer, in whatever class of vessel he served, was a national asset; he was of value to the nation, but to maintain this value, he must be kept abreast of the times, fully informed as to the advancement and progress in engineering science, particularly as regards all that pertains to the design, construction, and working of the vessel and its machinery. How were the engineers who were at sea to be kept properly informed and educated as to all the advances that were being made? How were they to be kept up-to-date—abreast of the times? This was essential if they were to be efficient, for during the last few years, engineering matters have moved quickly. He would hark back to the farsighted policy of those who initiated and founded the Institute. What was happening then? And what did the future portend? Higher boiler pressures, the triple-expansion engine and the turbine, forced draught, oil and gas as prime movers, an extended knowledge and use of electricity. Small wonder, then, that these men said we must look to the future of our engineers, and the position was the same to-day, but to a greater extent. Shipowners were alive to the importance of the knowledge of the marine engineer being kept up-to-date, and in all seriousness he would ask them to give to this Institute their continued and cordial support. He would now report the progress of the new premises fund. This important scheme was first considered by the Council in 1907, a Committee was appointed in March, 1908, and the present City Premises Committee was appointed in May, 1910. The first meeting of this Institute over which he presided, in June last, was in connection with the new premises. Negotiations were proceeding satisfactorily for a most suitable site, between the Tower Bridge and the City, and convenient for Fenchurch Street and Mark Lane Stations. An illustration of the new buildings would be found on the back of the menu. The leading features would be the securing of an annual income by letting a portion for offices, etc. The building would contain lecture hall, reading-rooms, offices and all the rooms necessary for the carrying on of the work of a scientific institution. The library would be taken in hand, and supplied with the most recent books dealing with engineering matters. There would be a good supply of engineering literature, and they hoped to make the Institute the home of the marine engineer, and especially those in active service, both on shore and at sea. Naturally they wished to increase the membership, and were confident that, with the premises in this central position, and the better facilities offered to members, many would be induced to join. With regard to the capital sum required, his predecessor (The Most Hon. the Marquis of Graham) stated a year ago that £20,000 was needed. Six months ago they

DINING SALOON.

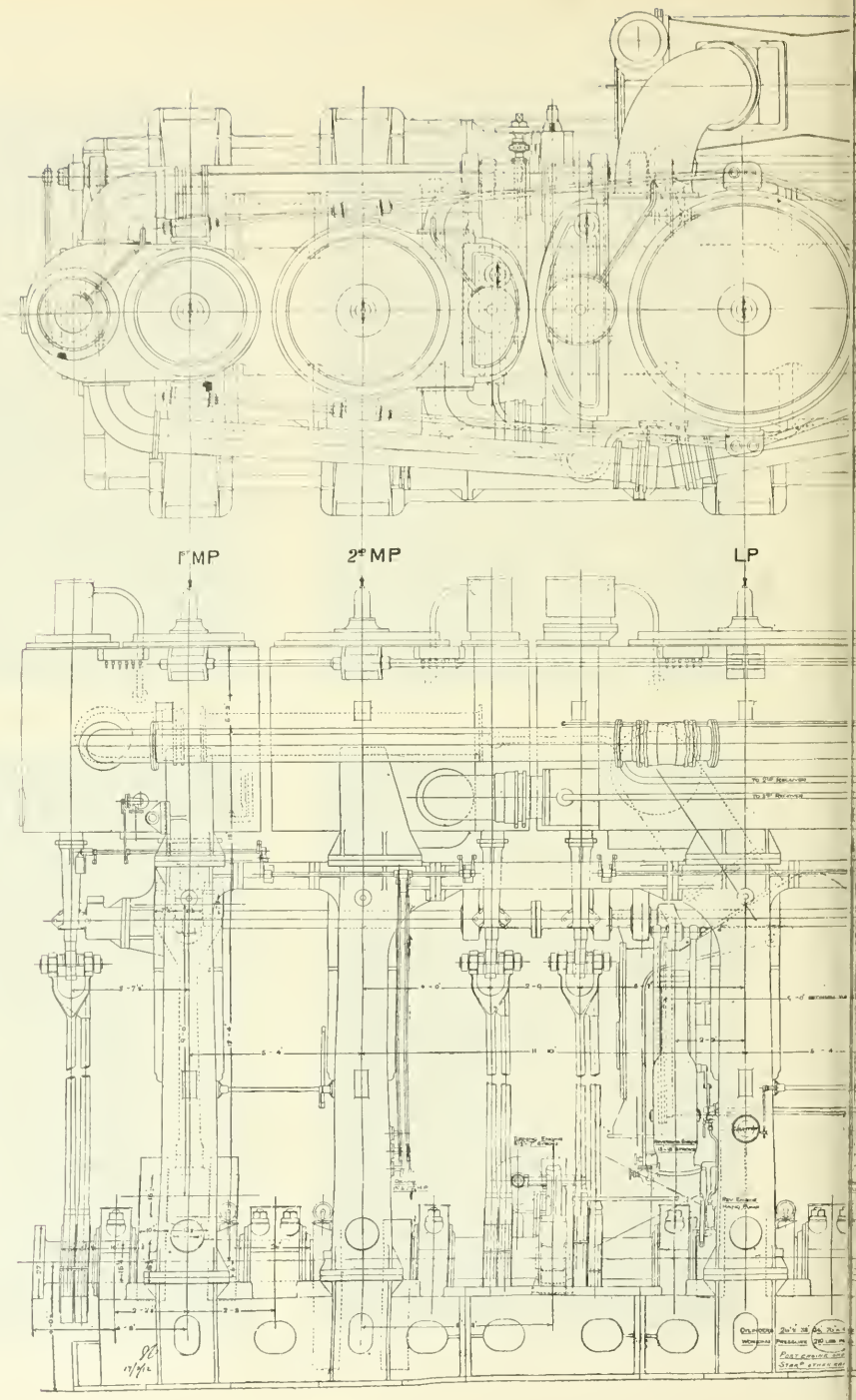


STARTING PLATFORM, LOOKING AFT.

MUSIC ROOM.



1ST-CLASS SMOKING ROOM.


1ST MP
2ND MP
LP

Twin-Screw Steamer "INDARRA."

9,200 tons. 10,000 h.p.

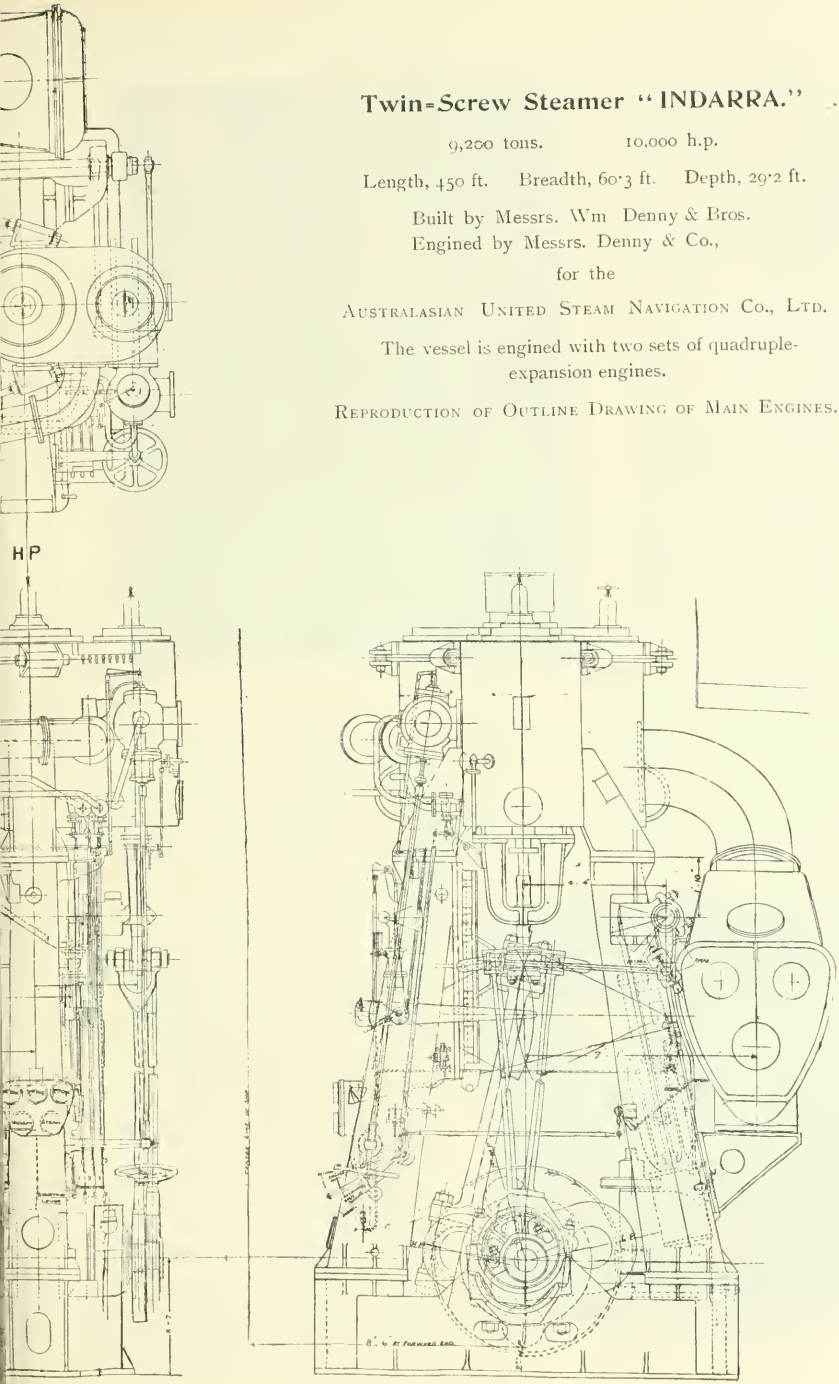
Length, 450 ft. Breadth, 60·3 ft. Depth, 29·2 ft.

Built by Messrs. Wm Denny & Bros.
Engined by Messrs. Denny & Co.,
for the

Australasian United Steam Navigation Co., Ltd.

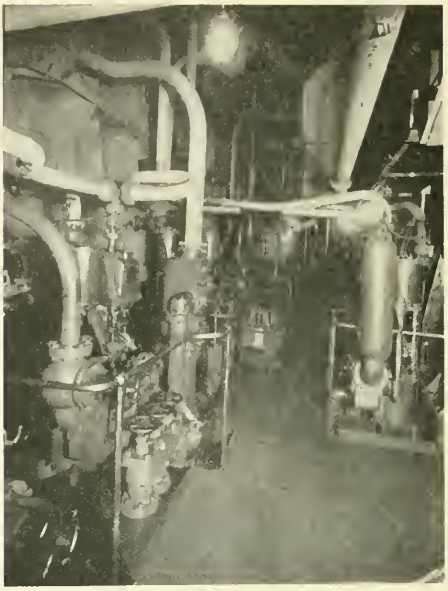
The vessel is engined with two sets of quadruple-expansion engines.

Reproduction of Outline Drawing of Main Engines.



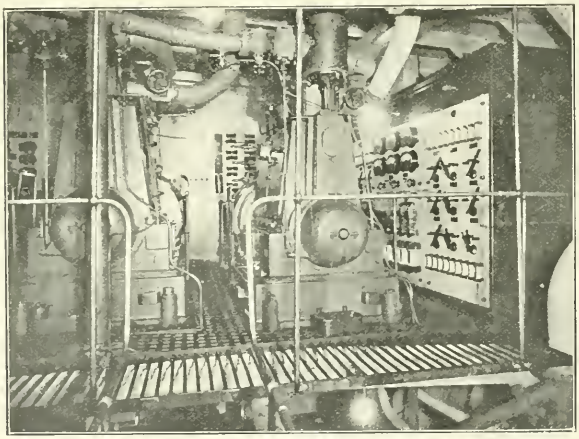
it is difficult to realize at sight of it that one is on ship-board. The dressing rooms are placed around the tiled landing from which descent is made into the 6 or 7 ft. of water, wherein swimmers may disport themselves in an area of some 600 square feet. Hot or cold salt or fresh water may be enjoyed in spray, wave or shower from overhead or underneath. Surely home and seaside comforts are combined by the designing mind and hand, which are in evidence all around. The catering department is fully equipped to meet the claims and calls of passengers. Filters are placed in the passages so that the passer by may quench his thirst in filtered water. The galley with its electric egg boiler and electric toaster, is replete with all the latest arrangements for preparing food for all on board. To save the getting up and down stairs from the upper deck to the swimming bath a litt (Messrs. Waygood's) has been provided. Fans and electric light fitted in saloons and cabins throughout add greatly to the luxurious appointments. The letter and message distributing bureau occupies a well-chosen position for passengers to obtain their correspondence. The wireless operator has good roomy accommodation conveniently placed abaft the chart-room. The cargo work is carried on by means of hydraulic gear constructed by Messrs. Fullerton, Hodgart & Barclay, Paisley. The cranes work quietly without that disturbance to passengers associated with steam winches. The steering gear is actuated by steam, the engine being by Messrs. Clarke, Chapman & Co., Gateshead.

In addition to the hydraulic cranes, there are four powerful steam winches and 10-ton derricks for working heavy cargo weights, warping capstans are fitted abaft the windlass forward and near the steering house aft. Electric capstans are on the boat deck for manipulating the boats. One of Clayton's fire-extinguishing apparatus is fitted, the generating plant being in a compartment on the lower boat deck, readily accessible to the engineer officers, who are berthed near the engine-room with a passage down from the ally-way. The deck officers are berthed near the bridge deck, the captain's rooms being on the forward end. The electric current for light and power is provided by three sets of dynamos by Messrs. Siemens, driven by vertical enclosed type of engines by Messrs. Shanks, Arbroath; these and the large switchboard on the port side of the engine-room on the second platform are illustrated. On the starboard side is placed the refrigerator, a CO_2 machine by Messrs. Haslam, with capacity to deal with the ship's provision chamber. The view showing the starting platform is t ken from the forward bulkhead looking aft towards the triple-expansion hydraulic engine (Messrs. Fullerton, Hodgart & Barclay), which keeps the cranes at work for cargo purposes. The pumps for sanitary, ballast, hot and cold water tanks are



PORT SIDE OF ENGINE ROOM, LOOKING FORWARD.

placed in the wings, so also are the air and circulating pumps for auxiliary condenser; some of these may be seen in the view taken from the aft bulkhead looking forward on the port side with the independent feed pumps in the distance. On the starboard side are the evaporators and additional pumps. The air and circulating pumps for dealing with the main engine steam are independent, no pumps being driven off the main engines. The fans for forced draught tothe boilers are placed in a recess at the forward end of the engine-room on a level with the top platform. The boilers are single-ended, with four furnaces in each, or twenty-eight in all. There are two thwartship firing platforms, six of the boilers being placed back to back, three in a row. The propelling machinery of this steamer consists of two balanced quadruple-expansion engines, the general design of which is shown in our illustration on pages 158-159. The diameters of the cylinders are 26½ in., 38 in., 54 in. and 76 in., with a stroke of 4 feet. Steam at a pressure of 210 lbs. is supplied by the seven single-ended boilers working under Howden's system of forced draught. The condensers are of "Uniflux" design; the twin air pumps and feed pumps are of Messrs. G. & J. Weir's manufacture; the centrifugal pumps are by Messrs. M. Paul nd Company, Dumbarton; the feed heater is of surface type. The general engine-room outfit of auxiliary pumping machinery is very complete, comprising separate bilge pumps, ballast pumps, sanitary pumps, pumps for hot, fresh and salt water—all by Messrs. Dawson & Downie. This system is cross-connected in such a manner as to enable the duties to be performed under the various conditions of working or overhauling which may occur at sea or in port. Ross-Schofield circulators are fitted in the boilers, and



DYNAMOS AND SWITCH BOARD.

Diamond blowers and "Dahlmer's" apparatus are fitted for cleaning tubes. The air to the furnaces is supplied by two large fans constructed by Messrs. M. Paul & Company, the engines being of the enclosed forced-lubrication type. Two Sees' ash ejectors are fitted in each stokehold, the pumps for these being supplied by Messrs. Clarke, Chapman & Co., Ltd.

After a series of exhaustive trials on the 4th and 6th November, during which the working of boilers, engines and auxiliary machinery gave every satisfaction, the vessel proceeded to London on the evening of the 6th to take passengers and cargo for her maiden voyage to Australia. Opportunity was taken on the way to London to test the boiler power of this steamer, and on a continuous thirty-eight hours' trial from the Tail of the Bank to Dungeness, with only five boilers in action, the vessel steamed steadily, under varied weather conditions, at an average speed of 16·68 knots. A McNab indicator is fitted on the bridge to show the revolutions of each set of engines, and the movements ahead and astern.

In closing this description of a fine steamer, it is fitting that thanks should be accorded to Captain Osborne and Mr. D. Irvine, chief engineer, for their courtesy to our representative on the occasion of his visit to obtain the photographs, which are reproduced, and our best wishes accompany them on their voyage to Queensland.

MARINE MOTOR NOTES.

THE orders booked for motor vessels during the past month have mainly been for small craft, including auxiliary sailing vessels. The motor auxiliary—formerly a sailing barque—the *Earlshall*, recently fitted with a 120-h.p. Bolinder's engine, is now under way. The good service rendered by the motor when entering and leaving port has been made abundantly clear and no doubt in the region of calms it will be found in the case of the *Earlshall* of even greater value to the owners by reason of more expeditious voyages—indeed, the results from the sailing vessels already in service show the utility of the auxiliary motive power. The orders placed by the Admiralty for oil engines with Messrs. Scott & Co. and the Fairfield Co. on the Clyde, is another step towards gaining experience with the internal combustion engine by ship and engine builders, as well as by engineers who oversee their construction and supervise their working. The engines referred to are intended for oil-tank vessels which are being built at Chatham and Devonport, and are to be of the F.I.A.T. and the Nurnberg designs respectively. It would appear to be a propitious time now for the Admiralty to revive the engineer branch of the Royal Naval Reserve, which has, for a few years past, become as a dead letter. The object which should be specially kept in view is the training requisite for vessels fitted with internal combustion engines. The subject of gas engines has been closely followed and studied by engineers of the mercantile marine for some time past, and many have taken advantage of opportunities of examining and witnessing the working of these engines in order to be ready for future requirements, and a Reserve of such officers would appear to be most desirable at the present time. The engineer is the most important factor on the modern vessel—whatever the motive power may be—and this is becoming better recognised day by day, hence the desirability of having his position and capabilities so brought forward that fuller advantage may be taken of what has been frequently referred to as a valuable national asset—too long kept hidden by traditional policy and directed to some extent by traditional dogmatism. Another of the Coasting Motor Shipping Co.'s vessels has been delivered by Messrs. Cran, Leith, fitted with a 4-cylinder semi-Diesel direct reversing engine of 130 b.h.p. by Messrs. Beardmore. The trials were conducted on the Forth satisfactorily and the vessel, of 270 tons, proceeded north to load. The new Trinity House pilot cutter, built by Messrs. Millar, Anstruther, and fitted with a Beardmore crude oil engine of 80 b.h.p., has been tested at work and is about to proceed on official trials. The *Jutlandia* has been reported as having arrived at her destination after the maiden voyage, all going well and with satisfactory results in respect to fuel consumption as well as working the engines. The company commented upon as considering the building of a large vessel to be fitted with oil engines of about 3,000 h.p. is on the eve of placing the order, also for a similar vessel with triple-expansion steam engines and boilers to be fired with oil fuel; these vessels are intended for the Atlantic trade. The increase in the number of vessels being fitted with oil engines is creating a demand for skilled engineers who have gained some knowledge and experience in connection with this class of machinery. The comparatively large number of vessels on hand for the Coasting Motor Shipping Co. will give an impetus to engineers on the Clyde to gain the experience which many are desirous of possessing. The Presidents of the Institute of Marine Engineers and of the North-East Coast Institution of Engineers and Shipbuilders both referred in their addresses to the internal combustion engine and the education of engineers; Professor Watkinson also, in his presidential address to the Liverpool Engineering Society, dealt with the same subject, so that all concerned are having their attention strikingly directed to these points for consideration, with a view to widespread action in connection with this motive power, also the education and training necessary to equip engineers for the responsibilities of the situations they are looking forward to occupy.

THE MOTOR EXHIBITION.

THE Motor Exhibition held at Olympia, London, W., from November 8th to 16th, was crowded with visitors, and embraced those who possessed cars and desired to improve upon their possessions; those who intended to invest in cars and were on the look out for the best of the lot calculated to meet their tastes; by those who, while not in a position to buy, were interested in the improvements being made in the mechanism and general appearance of the cars, seen at their best; and by those whose business it was to induce buyers. Judging from the evidences and indications, each of the visitors—and exhibitors—had in some degree their wants satisfied. The exhibition was an excellent one, and was taken advantage of by the well-known makers, the larger proportion of them being British, and, in particular, Coventry. Several of the ship and engine builders of eminence, who turned their attention to motor-car building and developed this class of work as a side issue from their main works, are now recognised as prominent among the first-class makers represented at the exhibition. Among the makers of accessories, or more particularly of tyre makers, occurs a name well-known in the marine engineering circle, famed for packing, and the patent tyre has earned for itself as good a record on the road as the packing has on the sea. The firms who are well-known for their oils and lubricants made a good show of their samples, and were ready to advise or discuss the class of fuel oil or lubricant most suitable for the various kinds of machinery, and a number of valuable hints could be obtained from some of the experts in attendance. A road guide strip and instrument for attaching to a car was shown at one of the stalls; this appealed strongly to those who had ever experienced the sensation of arriving at cross-roads in the dusk, with the uncertainty of the right road to take. The strip is really a road map of the highway from one centre to another part of the country, with the off-shooting roads marked and their destination. The strip unwinds as the car proceeds, mile by mile, and, being to scale, a reference to it at any portion of the journey indicates the position. The strips are made for particular routes throughout the country, and should be very useful, whether by night or by day. A good deal of attention has been paid by motor makers to reduction of vibration, and with great success, so that the present day car is exceedingly more comfortable, and more healthy for the traveller than its predecessor on the road.

MESSRS. DOBBIE, MCINNES, LTD., state that their London office, formerly at 113, Fenchurch Street, is now removed to 9, Billiter Square, E.C., and the new telephone number is 4625 Avenue.

THE Dermatine Company have now produced a new valve called S.B. This is suitable where gritty or dirty water is met with, and is of particular interest to engineers of water-works and others in charge of deep well pumps. The Dermatine Company will be pleased to send full particulars to engineers, etc.

THE FLEETS OF THE MAIL LINES.

(From our Own Correspondent.)

The "Titanic" Claims.

SOME of the cases which are now being brought in the County Courts for compensation in respect of the loss of members of the crew of the ill-fated *Titanic* are causing strong comment on the part of the judges, who suggest that they are fraudulent. That some of them may not be sustainable in law may very well be taken for granted, but that some of the claimants honestly believe that they have claims can hardly be denied. Take, for example, the man who claimed for the loss of a brother who for twenty years had stayed with him in the intervals between his voyages. The Court here found against the claimant on the ground that he was not wholly or in part dependent on the deceased, and though the decision may have been right, it may well be that the loss of the deceased was a distinct pecuniary loss to the survivor who made the claim. The judge dismissed the claim with the remark that "the provision of a room was not for the support of the persons who let the room, but for the benefit of the persons hiring it." Of course the person who hires the room does so in the first instance for his own convenience. But the expenditure of his money in that way undoubtedly tends towards the support of the man who lets it, and that man feels the pinch when the payment ceases. No doubt the room remains and theoretically can be let at once to a new tenant. But in practice it may be found that, even if a suitable tenant comes along, he may not be willing to pay the old rent, or in other ways may not be as suitable as the one who is gone. Tenants, for example, who are away three-quarters of their time are not always to be found, and the loss of such an one, though not falling perhaps within the scope of the Workmen's Compensation Act, may be a real loss to the one who sustains it. A wise judge—who is essentially a kindly man of the world—knowing that the shoe pinches, would at least dismiss such a claim, if honestly made, with a sympathetic word. Then at Liverpool there has been a test case in the County Court to determine the exact position of the dependants of the eight bandsmen who went down at the post of duty. His Honour Judge Thomas has decided that no claim under the Act can be sustained, because the men, who were hired by an independent contractor, were not seamen within the meaning of the Act. The words of the section which defines a seaman are wide indeed, for they would seem to include any person employed in any position aboard ship. They certainly cover electricians, butchers, stewardesses and bathroom stewards, as well as the ordinary ratings in the three main divisions of the crew, deck-hands, engine-room squad, and catering department. But some sort of idea that the band were a luxury seems to have fixed itself in the judge's mind and that seems to have affected his decision. Further, of course, there is the point that the men were not signed on to the articles—this in deference to a suggestion from their Society made earlier in this very year—and that they, in fact, were carried as second-class passengers, though compelled by their agreement to obey the master of the vessel in regard to points as to which he would have no claim to the control of the ordinary passenger. Thus this case seems to be one as to which there is a great deal to be said on both sides, and it is therefore eminently one upon which the Court of Appeal should be called upon to adjudicate.

The Canadian Lloyd's.

Recent happenings in the St. Lawrence seem to have been very much against the Canadians in their contention that, after all their efforts towards the elimination of the "dangers of the St. Lawrence," the rate of premium charged by Lloyd's on vessels trading to those waters is so unfair as to amount to an undue discrimination against them, and for that reason the disasters of which I am about to speak seem to be a strong discouragement to those who would found a new Canadian Lloyd's, which would charge a lower rate for vessels navigating this river. A lower rate might indeed be charged, but it would be at the expense of the underwriters. The new organization, if it put its rates substantially lower than those now prevailing, would undoubtedly cease to be a commercial undertaking, and would constitute itself into a society for the lessening of the cost of transit by water to Montreal and other inland ports—a society which would effect its object by making losses in paying charges which under ordinary circumstances have to be borne by the ship-owner. In the last days of October there was the stranding of the Cairn liner *Bellona* in the St. Lawrence, near Traverse River. She lay in a bad position and prospects looked gloomy, but she was unexpectedly floated after about a week on shore and towed to Quebec. As much as 50 per cent. was paid for re-insurances whilst she was on the rocks, and the very day that brought the news of her salvage also told that the Norwegian steamship *Gladstone* had gone ashore at Orleans Island. But these casualties were quite eclipsed by the news that the fine triple-screw passenger steamer *Royal George*, of the Canadian Northern Railway, had gone ashore ten miles from Quebec, when just about to complete her voyage thither from Avonmouth. Of the 900 passengers and large crew which she carried, all were safely landed in spite of the very heavy weather which came on almost immediately. First reports indicated serious damage, and her prospects also looked gloomy, especially as the first attempts to float her were unsuccessful, and it was reported that the tides would not suit again till the 26th November, whereby she would be subjected to the various risks incident to her position for a certain fortnight. But later details have been more re-assuring, and it is not improbable that by the time these lines are in print the vessel may be in safety. Should she be floated, it may be thought perhaps that the accident occurred at the least inconvenient time, as, if she can be got out of the St. Lawrence before the navigation is closed, she may be brought to port and put into commission again by the opening of the new passenger season.

The *Royal George* is, of course, the old *Heliopolis*, one of the pair of sisters built for the Marseilles-Alexandria passenger service a few years ago, and subsequently adapted for the Atlantic passenger trade by her present owners. Her speed is a good eighteen knots and her passenger accommodation most luxurious.

Another disaster, in quite a different direction, has been the loss of the 5,000-ton twin-screw liner *Oravia*, of the Pacific Steam Navigation Company, by stranding in the Falkland Islands. The vessel in question, which was built some fifteen years ago by Messrs. Harland & Wolff at Belfast, was one of the mail steamers of the line, and in 1898, when she was new, she distinguished herself by making a trip unexampled for speed when homeward bound from Valparaiso. She was fitted with wireless, whereby the news of her trouble was quickly communicated, and, indeed, her installation had on a previous occasion achieved a remarkable record, a message from one of her passengers being got through a couple of years ago to Liverpool from a position near the place where she has now been wrecked. The passengers and crew of the *Oravia* are in safety, and may count themselves lucky that their accident occurred in the southern summer, for the recent enquiry into the loss of the British sailing-ship *Criccieth Castle* disclosed something of the rigours of winter in those latitudes. Indeed the story of the sufferings of the survivors of this ship—amongst whom were a woman and child—make a sad story indeed, and one that has its lesson in regard to the question of the provision of life-saving appliances at sea. For the *Criccieth Castle* had plenty of boat accommodation—a lifeboat and a long-boat, either of which could have carried all on board, being provided, as well as a dinghy. As the latter was not needed and not used, its existence may be disregarded. When the ship was abandoned in mid-July, some 170 miles from the Falkland Islands in heavy weather, the lifeboat was damaged in being launched, and so it was determined to put some of the crew into the long-boat. This had no sail, and so it parted company with the lifeboat during the first night after the abandonment, and it has never again been heard of. It was about a week before the lifeboat reached Port Stanley, and by that time the survivors were at death's door—two of them, indeed, subsequently succumbed to the results of their sufferings in the hospital at Port Stanley. Now though the provision of decked motor boats might have tended to shorten the length of the boat voyage and to lessen the sufferings of the occupants in such a case as this, a motor-boat would be likely to suffer more than an ordinary lifeboat

in launching, owing to her greater weight. And then there is the question of cost—a question which can only be met by international agreement which shall make it compulsory for all sea-going ships, of whatever nationality they may be, to carry similar approved appliances, whereby no shipowner would be unduly handicapped in competition with his fellows.

The Panama Canal.

is, it appears, to be definitely opened in the October of next year. The President of the United States has, by proclamation, now fixed the rates to be charged to vessels using the new waterway. One dollar twenty cents a ton on the ship's nett register will be charged for ordinary commercial vessels carrying passengers and for cargo, whilst ships in ballast will be entitled to a forty per cent. reduction off the charge named. Warships will pay fifty cents per displacement ton, but transports and other vessels belonging to foreign governments will be treated as ordinary vessels carrying cargo, and the rates in their case will be assessed on their tonnage, measured by the same scale as that applied to commercial steamers. They are accordingly to be measured for the assessment of dues like ordinary merchantmen. This is spoken of as an innovation, but it is nothing of the kind, for the same practice has long been followed in respect of the tolls payable for the use of the Suez Canal. Another point on which Americans seem uninformed is that relating to the intended decrease in the charge for transit of the Suez waterway. It is alleged that this reduction is being made from some fear of rivalry on the part of the Panama undertaking. This idea is, however, entirely mistaken. The boon which is to be granted by the Suez directors at the beginning of 1913 is but one of a considerable series of reductions made in accordance with a promise that as the increase of traffic through the Canal justified it, the amount of the tolls should from time to time be decreased, and, accordingly, if the Panama cut had never been made, the users of the older canal would have had the same consideration which is now promised them at the hands of the Paris Board.

In the middle of August the American steamship *Newport*, belonging to the Pacific Mail Steamship Company, was sunk at Balboa Wharf, Panama, by the fall of cranes due to a collapse of the wall against which she lay. The weight, which fell on her decks, caused much damage to the hull, and the vessel, which, though built as long ago as the year 1880, was valued at no less than £60,000, was forced over on her side, her masts sloping towards the land. The position was a difficult one for salvage, and time after time the attempts of those who were in charge of the operations were frustrated by some untoward happening. At last, however, towards the middle of November, the vessel was got afloat. A great deal of damage had, however, been done, the passenger and crew accommodation being especially ruined.

Messrs. Japp & Kirby,

a well-known firm of Liverpool shipowners, have taken advantage of the high prices at present ruling for tonnage and have disposed of the last of their steamships—the *Barra*. A couple of years ago this firm had half a dozen modern steamships, one of considerable size. They were—

Ship.	Year built.	Builders.	Gross tonnage.
Jura	1904 ...	W. Pickersgill, Sunderland...	3,751
Barra	1905 ...	W. Pickersgill, Sunderland...	3,761
Cara	1905 ...	W. Hamilton, Port Glasgow.	4,006
Shira	1906 ...	W. Pickersgill, Sunderland...	3,756
Soutra ...	1906 ...	Clyde S.B. Co., Port Glasgow	2,740
Kentra.....	1907 ...	W. Hamilton, Port Glasgow.	4,683

Such indications as this series of sales point to a feeling in well-informed quarters that present prices are hardly likely to be maintained.

A Mistake

appeared in these notes last month, and hardly had the issue been published when from several quarters the fact was brought prominently to my knowledge. In speaking of the names of the new P. & O. steamers, I referred to *Cashmere* as having once been in the P. & O. fleet list. The *Cashmere*, built in the year 1874 at Dundee by Messrs. Gourlay Bros., was, indeed, at one time a steamer of the line. But that was under her original name, which was *Thibet*. Hence the error in evidently carelessly referring to a note.

The Australian Navigation Bill,

which, in its original form, seemed likely to clash with the provisions of the Imperial Merchant Shipping Acts, has now been considerably modified. Thus it is no longer proposed to enact that the Board of Trade shall not, as far as Australia is concerned, over-rule a decision of a local Court of Inquiry to suspend an officer's certificate. Another clause which was likely to cause inconvenience has also been deleted. This proposed that when a seaman was left behind through illness, the full amount of his wages, together with a sum not exceeding fifty pounds was to be deposited for his maintenance by the shipmaster or agent. Further, the regulations as to wireless installations have been modified, so as to bring them pretty much into line with those which have been adopted by those countries which have made provision of these appliances compulsory in certain cases.

The National Insurance Act.

The Insurance Commissioners have settled a question which seemed likely to cause a good deal of trouble to shipmasters and shipowners. There was some doubt as to the status of pilots in regard to the Act, especially as the income of a pilot is not easily arrived at, and some of them undoubtedly do earn less than the £160 per annum which is made the limit of income. The question of any individual pilot's earnings will not, however, in future concern anybody but himself, as it is definitely explained that all pilots are outside the Act and so need not insure.

Yachting Cruises.

The White Star Line is extending its activities into a new direction. Yachting cruises from New York to the Levant have been customary institutions with its larger steamers for some years. But it has now announced that during the winter—when, of course, navigation to the St. Lawrence is closed—its two large and well-appointed steamships, *Laurentic* and *Megantic*—usually employed in its Canadian passenger service—will each make two cruises to the West India Islands and the Spanish Main. No doubt these opportunities will appeal to wealthy Americans in large numbers, and travellers from this side of the Atlantic will also be able to join the excursions by connection with the Southampton Mail steamers of the Company. The West Indies are beyond most places attractive to the tourist, and at last it would seem that shipping people and those for whom they cater are beginning to realize their possibilities, first really recognised by the late Sir Alfred Jones.

NAVAL MATTERS—PAST AND PROSPECTIVE.

(*From our Own Correspondent.*)

Portsmouth Dockyard.

WE had a visit from Sir Francis Hopwood, the additional Civil Lord of the Admiralty, and Sir James Marshall, the Director of Dockyards and Contract Work, early in November. A conference was held with the principal dockyard officials and the programme of work was discussed, when it is understood that the possibilities of building another battleship were gone into. The battleship laid down last month will no doubt be put afloat by May, and another ship could therefore be ready to take the water before the end of the next financial year. An extra £75,000 has been allowed for the construction of our new vessel before the end of March. The original amount allowed in the Estimates was £166,775, but this has now been increased to £242,270. Very good progress is being made with the ship, a number of men having been transferred to her from the *King George V.* The *Iron Duke*, which was launched last month, is in the large basin having her side armour plates fixed in position, and some of her heavy weights are also being shipped. The battleship *King George V.*, having carried out her trials, was commissioned on November 16th by Captain Mark Kerr for service in the Second Battle Squadron. The battleship *Monarch*, of that squadron, was taken into the new floating dock on October 31st. The draught of the vessel being 30 ft. 6 in., her weight was considerably more than that indicated by the official displacement of ships of her class,

but it was much less than the utmost lifting power of the dock. The test was quite satisfactory. The vessel entered the dock at noon, and by a quarter past four she was high and dry. She was undocked on November 2nd. On the 4th the battleship *Neptune*, flagship of Admiral Sir George Callaghan, the Commander-in-Chief of the Home Fleets, arrived to undergo a refit. The *Hercules* has completed her refit and has rejoined the Second Squadron. The battleship *Albemarle* has completed refitting, and is to be commissioned about the middle of December for service in the Fourth Squadron, First Fleet. The crew of the *Exmouth* is to be transferred to the *Albemarle*, and the former vessel is to leave for Malta for a refit. His Majesty's yacht, the *Victoria and Albert* has been taken in hand for her winter refit, which is to be completed early in February. The cruiser *Crescent*, of the Third Fleet, is to be taken in hand at Haulbowline, and is to leave here in time for her refit to be commenced on December 2nd.

Devonport Dockyard.

As briefly stated last month, the battleship *Marlborough* was launched on October 24th. Her launching weight was 9,000 tons, which is said to be a record. An accident unfortunately followed the launch. As the ship was being anchored a shackle broke, and the wire hawser attached to it sprang back among the officers and men engaged in the operation. Commander Winthrop, assistant to the King's Harbour Master, and three men were thrown down, the most seriously injured being the commander, who was struck on the head and had to be taken to the Royal Naval Hospital. The injuries of the three men were slight. Previous to the launch of the *Marlborough* the ceremony of laying the first keel-plate of the new cruiser was performed by Mrs. Churchill. The vessel is to be built on what is known as the old battleship slip, and she is to be one of the light armoured ships of this year's programme. On October 31st, the first keel-plate of a new battleship was laid by Mrs. Stokes, the wife of the admiral superintendent. The ship is being built on the slip from which the *Marlborough* was launched. Six working days only elapsed between the launch of the latter and the laying down of the new ship, which will be larger and of greater displacement than her predecessor. Her construction is to be expedited; indeed, she was commenced two months earlier than was originally intended. The amount provided for her construction in the present financial year was £166,073, but this has now been increased to £247,970. The battleship *Centurion* has shipped all her 13·5-inch guns, and most of her 4-inch gun mountings are on board. She is to be ready by December 6th to leave for her steam trials. Owing to the abnormal programme of shipbuilding, the authorities are experiencing some difficulty in finding sufficient shipwrights and engine-fitters to cope with the work. The new battle-cruiser *Princess Royal* was commissioned on November 14th, but at the time of writing the vessel is still in dockyard hands, having developed leaky condensers. A navigating party has proceeded to Dalmuir to bring the battleship *Conqueror* here. She is to be commissioned early in December for the Second Battle Squadron. A navigating party has also gone to Dalmuir to bring the cruiser *Dublin* here to be commissioned. The cruiser *Essex*, which had been relieved by the *Royal Arthur* in the Training Squadron, has arrived for refit. The cruisers *Warrior* and *Argyll* have completed their refits, as has also the destroyer *Nemesis*. Vessels in hand are the battleship *Bellerophon*, the cruiser *Carnarvon*, which will, it is understood, go to the East Indies as flagship, the cruiser *Suffolk*, whose refit includes the renewal of her funnels, the cruiser *Bristol*, the torpedo-gunboat *Skipjack*, and several smaller craft. The Admiralty have approved of a "merit board" being erected at each dockyard school for the purpose of a roll of honour of the names of ex-students who have risen to eminence. It is interesting to note that the Devonport list will contain eighty-three names. Mr. W. J. Clarke, who has been superintending engineer here since 1901, has been appointed to the Admiralty as Assistant Director of Engineering and Architectural Works.

Chatham Dockyard.

Great activity prevails in the yard, and overtime has had to be resorted to in order to get several of the vessels which have been undergoing refits out of hand. The cruiser *Chatham* left for her trials on November 7th and returned a week later, her steam trials having been postponed. The cruiser *Lowestoft* is being pushed on rapidly, material now being delivered in large quantities, and an effort is being made to make up for lost time, it being four months since she was laid down. With regard to the new cruiser which was laid down last month, a considerable quantity of material has been assembled, and it is anticipated that rapid progress will be made with her construction. The vessel's name has not yet been made known, but the Association of Men of Kent have memorialized the Admiralty to give her the name of *Rochester*. In consequence of the pressure of work there is a demand for shipwrights, but owing to the improved condition of the shipbuilding trade it is difficult to get them. As an inducement, work is being guaranteed up to the end of the financial year. On November 9th, Mrs. Anson, wife of the Admiral Superintendent, launched *E1*, the first of a new class of submarine. She is a more powerful vessel than either of the submarines previously constructed here, and will carry a gun. It is expected that the vessel will be completed and ready for commission by the end of March. Submarines *E2*, *E7* and *E8* are to be built and completed during the next financial year. The propelling machinery of all the vessels is to be made in the yard. The cruiser *Blanche*, senior officer's ship of the Fourth Destroyer Flotilla, has been taken in hand for her annual refit, as has also the cruiser *Andromache*, of the Second Fleet. The battleship *Formidable*, of the Fifth Squadron, was docked on November 11th for some adjustments to be made in her under-water fittings. The battle-cruiser *Inflexible* has completed refitting and has left for the Mediterranean to relieve the cruiser *Good Hope* as flagship of the Commander-in-Chief. Her sister-ship, the *Indomitable*, follows shortly, and the *Invincible* and *Indefatigable* are to join by the middle of next year. There will then be four "Dreadnought" cruisers in the Mediterranean. Her defects having been made good, the battleship *Jupiter* has gone to Sheerness to resume duty as gunnery ship. The cruiser *Iphigenia* has also proceeded to Sheerness on completing her refit, and resumed duty with the Second Fleet. After being here for several months refitting, the cruiser *Terrible* has returned to Portsmouth and rejoined the Third Fleet. The cruiser *Antrim*, on the completion of her refit, is to go to Sheerness, where she is to be completed to full crew on December 3rd for service in the Third Cruiser Squadron as a private ship, instead of flagship, as at first ordered. The battleship *Agamemnon* has arrived for her annual refit. The cruiser *Diamond*, senior officer's ship of the Fifth Destroyer Flotilla, has been ordered here to undergo a retubing refit. Several destroyers have come in for overhaul, including the *Beagle*, *Bulldog* and *Harpy*, of the Third Flotilla, and the *Viking*, of the Fourth Flotilla. The destroyers *Nautilus*, *Wolverine* and *Racoon* have completed refitting, and have rejoined the Third Flotilla, while the destroyer *Kale* is also out of hand, and has resumed duty with the Fifth Flotilla. Torpedo boats Nos. 30 and 31 have been passed out of dockyard hands and have gone to Harwich to rejoin the Eighth Destroyer Flotilla, and the *Tyne*, the depot ship of the flotilla, has completed refitting. Having been engaged on the East Coast survey since April, the surveying ships *Triton* and *Hearty* have been reduced to winter complement and laid up in the basin until next season. During the winter the surveying staffs prepare new charts from the observations made and soundings taken during the past season. The battleship *Vanguard* is due for refit at the end of November, and the work will be carried out while the vessel is in the new floating dock.

Sheerness Dockyard.

There is a small accident to report this month, but fortunately it was not attended with any loss of life. On the night of November 4th, the tug *Toxteth*, belonging to this yard, was sunk in collision in the Thames off Woolwich Dockyard with a vessel named the *Macbeth*, a Hull fish carrier. The tug was extensively damaged amidships, and went down five minutes after being struck, her crew losing all their belongings. The cruiser *Lancaster*, which had served in the Mediterranean Station for eight-and-a-half years, has been paid off at this port and recommissioned for service in the Fifth Cruiser Squadron at Devonport. The destroyer *Doon* has completed her refit and has resumed duty with the Fifth Flotilla at Harwich, as has also the destroyer *Liffey*, which was damaged in collision. The *Derwent*, of the same flotilla, has left for Gibraltar, where she is to undergo a

retubing refit. The *Moy* and *Foyle*, also of the Fifth Flotilla, have been taken in hand for an examination of their underwater fittings, and two destroyers of the Nore Flotilla, the *Electra* and *Zephyr*, have come in for refit. The naval trawlers *Seamew* and *Seaflower*, having finished their exercises on the East Coast, have been taken in hand for overhaul. Other vessels to come in are the torpedo gun-boats *Jason* and *Speedy*, which are to be refitted. Torpedo boats Nos. 5 and 15, and submarines *C2*, *C5*, *C6* and *C22* are still in hand. The additional Civil Lord of the Admiralty, Sir Francis Hopwood, paid his first official visit to Sheerness at the end of October, and was conducted over the yard by Captain-Superintendent Prendergast. Sir Francis afterwards went on to Chatham, to meet Dr. Macnamara, M.P., the financial secretary to the Admiralty, and Sir James Marshall, the Director of Dockyards. On November 15th, the Swedish armoured cruiser *Fylgia* arrived on a five days' visit. The vessel has a displacement of 4,060 tons, and her armament consists of eight 6-inch and fourteen 6-pounder guns, her complement of officers and men numbering 322.

Pembroke Dockyard.

The cruiser *Amphion* should soon be ready for her trials, which, it is expected, will be carried out during December. There has been a great deal of delay, due, as already reported in these columns, to a change in the type of turbine. The new turbines are, however, a distinct improvement as regards economy of space in the engine-rooms. The two connecting pieces, which complete the turbines, have been lifted in, and this has allowed the plates in the deck, which had been left loose, to be put in position, and the ship generally to be pushed on towards completion. It is probable that the cruiser *Nottingham* will be launched in March. In order to facilitate building operations, four drilling machines and a new double punching machine have been erected at the head of No. 2 slip. This will be a great aid to pushing on the construction of the vessel, to which a number of additional hands have been transferred. The *Nottingham* is entirely framed to the full height from the stem to the stern post, and the internal work and external plating are being proceeded with rapidly. The stern post, a heavy steel casting, is being supplied by contract, but it has not yet been delivered, therefore it will not be possible to get the hull completed aft, in order to permit boring operations for the propeller shafts to be put in hand, much before the New Year. The destroyer *Nith*, of the Fifth Flotilla, has arrived from Chatham for a retubing refit. The *Waveney*, which has had her boilers retubed, is to join that flotilla. She has been commissioned by the crew of the *Nith* and taken to Chatham. The destroyer *Ouse* has completed her refit, and has been commissioned for service in the Fifth Flotilla by the crew of the *Ness*, which has been taken in hand for a retubing refit. Torpedo boat No. 045 is still in hand.

FOREIGN NOTES.

France.

THE various shipyards have secured a large number of orders; some of the most important are the following:

The Chantiers de la Ciotat, an order for a fast mail steamer to be called the *André-Lebon*, to the order of the Messageries Maritimes, to be employed on their line to the Far East. The three Chantiers of Havre, St. Nazaire and Bordeaux, three mail steamers to be called the *Parthos*, *Sphinx* and *Athos*, also to the order of the Messageries Maritimes for service on their various passenger lines. These four mail boats will be supplied with refrigerating plant of the Westinghouse-Leblanc type.

The Compagnie Générale des Bateaux Parisiens have placed an order for a passenger steamer with the Chantiers de la Pallice; the vessel will be employed on the Seine.

The battleship *France* has recently been launched at the shipyard of St. Nazaire; she has been constructed by the Chantiers de la Loire.

The *Rouen* has recently been put through her trial runs between Dieppe and Newhaven, covering the distance in two hours and 42 minutes, thus the *Rouen* becomes the fastest steamer in the Channel service. She has accommodation for about 1,000 passengers and is turbine driven.

The Chantiers de la Loire at Nantes have launched the cargo steamer *Constance*, built to the order of the Compagnie de Navigation. The vessel is of 3,500 tons carrying capacity and her propelling machinery will give the *Constance* a speed of 12-13 knots. She will have limited passenger accommodation.

Two sister ships are in course of construction by this yard to the order of the same steamship company.

The Société Navale du Snd, which has just been formed at Marseilles, will purchase five steamers, two of which are now building in England, whereas the orders for the other three are to be placed with French firms. The vessels are to be used as tramp steamers for the transport of coal.

U.S.A.

The Admiralty Committee, under the presidency of Admiral Dewey, has prepared a statement which asks for the grant of the necessary means for next year for the construction of four battleships of the *Pennsylvania* class of 31,000 tonnage; of two large fast armoured cruisers and a number of other units of various types. It is also stated that there is a great need of torpedo boats and of coaling and oil-fuel ships for the fleet.

Holland.

The Tank steamer *Emanuel Nobel* has just been successfully launched at Amsterdam, where she has been built to the order of the Société Commerce Ltd., at Antwerp. Her carrying capacity is 6,250 tons. Two Diesel motors of the Werkspoor type of 1,100 h.p. each give the vessel a speed of 11 knots.

Austria.

A new dock able to accommodate the battleships now in course of construction is to be provided, and the order for the necessary material will be placed with firms abroad, as a great saving will be effected.

The Ship Construction Budget for the years 1915 to 1918-19 has been practically established, and provides for four Dreadnoughts of 24,000 tons each at a total cost of 28 million crowns each, three armoured cruisers at a cost of 10 million crowns each, eighteen torpedo boats at one million crowns each, four gunboats for the Danube at one and a quarter million crowns each, three patrol boats at 300,000 crowns each, and three steamers for official services at 1½ million crowns each. It is probable that a number of submarines will also be included.

The cruiser *Saida* has just been launched at Triest. The cargo steamer *Pala*, of 8,250 tons, has just been launched at Moncalfone, having been built to the order of the "Freie Schiffahrt" Co., Ltd. The vessel will steam 11 knots on full load and is expected to be completed very shortly.

Germany.

German shipyards have received several orders, of which the following are the most noteworthy. The Oder Works, a cargo screw steamer of 2,000 tons, speed 9½ knots, to the order of a foreign shipping firm. The Bremer Vulkan at Vegesack, a cargo steamer of 9,000 tons to the order of the Hamburg-S. American Shipping Co. The Weser, Ltd., at Bremen, two cargo steamers of 9,000 tons each to the order of the before-mentioned shipping company. The firm Nuske & Co., Ltd., at Stettin, a cargo steamer of 1,100 tons for foreign account. The Tecklenborg Shipyard, Ltd., a cargo steamer of 12,000 tons with engines of 3,800 h.p., to the order of the Kosmos Shipping Co., at Hamburg. The Seebeck Shipyard, Ltd., at Geestemunde, a cargo and passenger steamer of 4,500 tons to the order of the Argo Steamship Co., at Hamburg. The Neptune Shipyard at Rostock, two cargo steamers of 4,500 tons each to the order of the same company. The Stettin Oder Works, a cargo steamer of 2,300 tons to the order of the before-mentioned company.

The *Australia* has been successfully launched at Flensburg, where she has been built to the order of the German Australian Steamship Co. This vessel has a carrying capacity of 12,000 tons.

The Bremer-Vulkan has six cargo and passenger steamers, each of 11,000 tons, in course of construction for the North German Lloyd.

The Neptune Shipyard at Rostock has successfully launched the cargo and passenger steamer *Valesier*, built to the order of the Hamburg-America Line. The vessel has a carrying capacity of 5,500 tons and will be fitted with an engine of 2,700 h.p., giving her a speed of 12 knots. Accommodation for 642 passengers is provided.

The Steamship Company "Hansa" has at present nine large steamers in course of construction at the Bremen shipyards, totalling 47,600 tons; in addition to these steamers the "Hansa" has placed orders for three steamers of 9,000 tons each with the Weser and Flensburger shipyards.

The well known shipyard of Shichau has just celebrated its 75th anniversary and to celebrate the occasion the workers were feted and agreeably surprised by the munificence displayed by the Shichau management, which is in the hands of the founder's daughter, her husband being the director of the works. Large sums of money were given as endowments to benefit funds, amounting to £100,000, and in addition every employé was accorded a month's salary and gratuities in proportion to the number of years employed in the works. The Shichau shipyard is well supplied with orders for Russia and other countries, especially torpedo boats.

The *Ramses*, cargo steamer, built to the order of the Kosmos Steamship Co. at Hamburg, has just been through her trial runs, which were exceedingly satisfactory. Her length is 149 m. and her carrying capacity 12,000 tons on a draught of 8 m. The *Ramses* is fitted with a triple-expansion engine of 3,600 h.p., and is also equipped with a Clayton apparatus for fumigation and fire-extinguishing purposes.

The Shipyard Bremer-Vulkan at Bremen Vegesack has just launched the *Sierra Ventana*, a cargo and passenger steamer built to the order of the North German Lloyd for service on the South American line. Her length is 139·6 m., beam 17·07 m., and on a draught of 8·4 m. she has a carrying capacity of 8,800 tons. She will be propelled by two triple-expansion engines developing a total of 4,200 i.h.p., and her speed will be 13½ knots.

Norway.

The Government has invited tenders for the construction of the two battleships granted by the Storthing and eleven tenders have been received, five being from English firms, which are being favourably considered, but there is keen competition by the German firms, who have submitted four tenders. One French and one Italian firm are also competing.

Denmark.

The Forenden Steamship Co., at Copenhagen, has had the *Avanti*, of 3,000 tons, built to its order and fitted with the Sieurins coal discharging plant. The trial of the plant has been very satisfactory.

Russia.

The Government has placed orders for a part of its building programme; two small cruisers with Schichan at Elbing of 3,500 tons displacement; the order for two armoured cruisers has been placed with the Putilow Works, and two small cruisers with the Reval Shipyard. The Putilow Works have also received an order for eight torpedo boats, the Reval Shipyard for six, the Ziese Shipyard at Riga for nine, the Lange & Son Shipyard at Riga for five torpedo boats. An order for two battleships and four cruisers has been placed with the Nikolaieff Shipyard. In order to complete these vessels as soon as possible their machinery may be ordered entirely or partly abroad.

AUSTRALIAN MARINE ENGINEERS.

MARINE engineers on the Australian coast have been negotiating for increased pay, definition of hours, with overtime, and grants of leave. The results of the deliberations have been published, as agreed upon by owners and the arbitrators. The scale of pay is regulated by the horse-power, and the minimum for chief engineers varies from £22 to £32 per month; 2nd engineers, £17 10s. to £22; 3rd engineers, £15 10s. to £18; 4th engineers, £14 to £15; 5th, and over, £12 per month. The horse-power on which these rates are based commence at under 100 to 450 or over. The hours of work are to be eight hours per day. The overtime payment for engineers, other than the chief, is 2/6, and for the chief, 5/- per hour. There are certain restrictions, however, with regard to overtime. The leave time allowance per twelve months for a chief engineer is twenty-one days, and for other engineers fourteen days, on full pay. In the event of a steamer being laid up for repairs, or other purpose, and the engineers' services retained, they are to receive full sea pay and board, or an equivalent.

Industrial and Trade Notes.

THE CLYDE AND SCOTLAND.

(From our Own Correspondent.)

BOTH in respect to completing the outfit of new vessels and handing them over to their owners, and of consigning fresh tonnage to the water, Clyde builders have been very active since the notes in last issue were penned. As regards naval work, several notable additions to the British navy left the hands of their builders. These consisted of the super-"Dreadnought" *Conqueror*, which left her builders' tidal basin—Messrs. Wm. Beardmore & Co., Ltd., Dalmuir—and proceeded to the Tail of the Bank; the second-class cruiser *Southampton*, built by Messrs. John Brown & Co., Clydebank, and the battle-cruiser *New Zealand*, the product of the Fairfield Engineering & Shipbuilding Co., Ltd., Govan, and, as is well known, the contribution of the Dominion of New Zealand to the Imperial Navy. These several vessels are very shortly to proceed to Devonport to be commissioned. Another naval unit, which has undergone completion, is the torpedo-boat destroyer *Acasta* built by Messrs. John Brown & Co., Clydebank, which on Nov. 19th, was successfully tested for speed on the Firth of Clyde. Before the end of the year it is anticipated that the battle cruiser *Australia*, also from the stocks of Messrs. John Brown and Co., will leave her builders' hands for commissioning. The gap made by these departures, it is hoped in Clyde circles, will soon be filled—probably before these notes meet the eyes of our readers. The Fairfield Company and Messrs. Brown, of Clydebank, are understood to run a very strong chance of booking the orders for the two super-"Dreadnoughts," the contracts for which are just about to be placed by the Admiralty.

The Fairfield Shipbuilding & Engineering Co., Govan, launched, on November 23rd, the *Empress of Asia*, the second of the two splendid quadruple-screw Parsons' turbine steamers, being added to the fleet of the Canadian Pacific Railway Company for service between Vancouver and Japan and China. The sister-ship, *Empress of Russia*, which was launched on August 28th, is completing her outfit in the tidal basin of the builders. The new vessels are each of 15,000 tons gross, and will be not only the largest merchant ships sailing in the Pacific, but will also be, by nearly 2,000 tons, the largest of the fleet of over fifty vessels owned by the Canadian Pacific Railway Company. It is noteworthy that they are the first vessels to be built with an ability to float with any four compartments flooded, instead of two, which has been the Board of Trade standard. Their machinery embodies important improvements in turbine propulsion, a feature being the introduction of an intermediate pressure turbine, which will provide a much wider range for the expansion of the steam, and will effect a marked advance in the problem of economical steam consumption. The ships are designed for a speed of 20 knots, and are to have accommodation for 1,100 passengers and a complement of 475 officers and crew, while the cargo capacity amounts to about 4,000 tons.

Messrs. Alex. Stephen & Sons, Ltd., Linthouse, launched, on November 9th, the twin-screw steamer *Canberra*, built to the order of the Howard Smith Co., Ltd., of Melbourne, for their passenger and cargo service on the Australian coast. The vessel's dimensions are:—Length, 410 ft.; breadth, 57 ft., and depth, 42 ft.; with a gross tonnage of about 7,700 tons. The propelling machinery, which is designed to give a speed of 16 knots loaded at sea, consists of two sets of quadruple-expansion balanced engines, supplied with steam from six boilers. She will have accommodation for a large number of first, second, and third-class passengers, and will carry a small amount of cargo and some cattle. The cargo will be handled by hydraulic cranes and derricks, and a portion of the hold will be insulated and refrigerated for fruit or other perishable goods. The life-saving appliances have been specially considered, and include a large motor lifeboat. Waygood lifts will be fitted in the first and second-class accommodation.

Messrs. Mackie & Thomson, shipbuilders, Govan, who

launched, on November 7th, a twin-screw passenger and cargo steamer 300 ft. in length, having sleeping accommodation for 120 first-class and 100 steerage passengers, to the order of Messrs. John M. Campbell & Son, Glasgow, for Brazilian owners, have (by arrangement with Messrs. Harland and Wolff, Belfast and Govan) received an order to build two steamers, each of about 7,000 tons carrying capacity. The vessels, it is understood, will be built in the Govan shipbuilding yard, which is to be taken over next year by Messrs. Harland & Wolff. Messrs. Mackie & Thomson, who are removing to Irvine, will have started operations in their new premises by the time the two vessels referred to are completed. These vessels, it may be added, will be the largest ever built in the Govan shipbuilding yard.

Messrs. D. & W. Henderson & Co., Partick, have been commissioned by Messrs. C. T. Bowring & Co., Liverpool, to build an oil-tank steamer of about 10,000 tons.

Messrs. Alex. Stephen & Sons, Linthouse, have secured from the Anchor Line (Messrs. Henderson Bros.), Glasgow, an order for the construction of the large twin-screw vessel for which tenders were recently invited from both Clyde and north-east coast firms. The new vessel, which is to be employed in the Mediterranean-New York trade, will be about 520 ft. by 64 ft. to the shelter-deck, and will steam 14 knots. Accommodation will be provided for a limited number of first and second-class passengers, and for a large number of emigrants, about 2,500 passengers and emigrants in all being provided for. From the managers of the Clan Line (Messrs. Cayzer, Irvine & Co., Glasgow), the Linthouse firm have received an order for a steamer of 8,400 tons deadweight and 430 ft. in length. The Linthouse firm, in their ship-repair branch, have been experiencing more than the usual amount of difficulty in satisfying the demands of the riveters engaged on the work of lengthening the Aberdeen liner *Miltiades*. After the vessel had been cut in two and the riveting started, they struck work and practically nothing was done from October 7th till November 11th, when they were induced to resume by their executive, on piece-work rates, and await discussion and settlement of the dispute in a regular way.

Messrs. Charles Connell & Co., Scotstoun, have received from the managers of the Clan Line an order for a steamer of 8,400 tons deadweight, similar to one ordered from Messrs. Stephen & Sons, as above noted.

Messrs. John Fullerton & Co., shipbuilders, Paisley, have booked an order from Mr. E. Radonicich, Glasgow, for a large and powerful salvage steamer fitted with all the most up-to-date salvage appliances and wireless telegraphy. The vessel is intended for service in South America.

Messrs. Napier & Miller, Old Kilpatrick, who recently launched for the Monarch Steamship Co., Glasgow (Messrs. Raeburn & Verel, managers), the steamer *Saxon Monarch*, of 5,000 tons, have secured a further order from the same Company for a cargo steamer of about the same tonnage. The new vessel will be the eighth vessel built for the same owners by this firm during the past half-dozen years.

Messrs. Wm. Denny & Bros., Dumbarton, have been commissioned by the New Zealand Shipping Co. to build and engine a large twin-screw steamer intended for the Company's trade between Great Britain and Australasian ports.

Messrs. Scotts' Shipbuilding & Engineering Co., Greenock, have contracted with the Cunard Steamship Co. for the construction of a third large twin-screw passenger steamer, which will be larger than the two which are at present under construction at the firm's yard for the same company, and, in fact, the largest passenger steamer yet built on the lower reaches of the Clyde. The two Cunard vessels, at present on the stocks, were ordered in January of this year. They are each to be about 540 ft. in length and of 13,000 tons gross. They are intended for the Company's Canadian trade. The Scott firm have also been entrusted by the British Admiralty with the order to construct the machinery for an oil-tank vessel which will be built at the Government Dockyard, Chatham. The propelling machinery will consist of two sets of internal combustion engines, F.I.A.T. type, for which Messrs. Scotts' are licensed in this country. This is the first order to be placed on the Clyde by the Admiralty for oil-driven engines.

Messrs. Wm. Hamilton & Co., Port Glasgow, have received orders from two Liverpool firms for a cargo steamer each, both of which are to be built on the Isherwood system. The firm have at present on hand eight steamers, most, if not all, of which are to be built on this principle, and they have also on the stocks a floating dock for the British Admiralty. An additional order has just been received for the construction of a cargo steamer of 9,750 tons and a speed of 12 miles laden from the Stoomvaart Maatschappij Nederland.

Messrs. Murdoch & Murray, shipbuilders, Port Glasgow, have contracted with the Anchor Line (Messrs. Henderson Bros.), Glasgow, to build a twin-screw tender for service on the Clyde. The new tender will replace the *Express*, built on the Clyde in 1880.

Messrs. Ramage & Ferguson, Leith, about the end of October received the order to build and engine a steamer for the North of Scotland and Orkney and Shetland Steam Navigation Co. The vessel will be a duplicate of the *St. Magnus*, of 957 tons gross, which was launched by the firm for the same owners early this year. The new vessel is intended to take the place of the *St. Giles*, which was sold recently.

The Caledon Shipbuilding & Engineering Co., Dundee, have, it is reported, contracted for the building and engining of two 12-knot twin-screw coasting steamers, each of 2,500 tons gross, for the Royal Mail Steam Packet Co.

Messrs. Mackay Bros., shipbuilders, Alloa, who, about the end of October, launched a steamer of 3,500 tons to the order of Mr. J. T. Duncan, Cardiff—which will be used as a Navy collier—have received a contract to build a steamer of 3,600 tons for English owners. On the 9th November, the firm launched a steamer of 2,300 tons, built for Messrs. J. & J. Denholm, Greenock, the engines for which will be fitted by Messrs. McColl & Pollock, Sunderland. Messrs. Mackay Bros. have three other steamers in hand of an aggregate of 11,000 tons.

Messrs. J. & G. Forbes, of Sandhaven, have built for Colonel the Hon. Sir H. Crichton, of Netley Castle, Netley Abbey, a steam yacht of somewhat novel character. While fitted out luxuriously as a yacht, the vessel resembles a fishing drifter in design, the idea being that she should stand all kinds of weather, which an ordinary yacht could not do. The *Chimæra*, as she is named, is built of wood, the frames of oak, the planking of larch and pitch pine, and the deck and rails of teak. The machinery, which is all above Board of Trade and Lloyd's requirements, consists of a pair of compound surface-condensing engines of 200 i.h.p., supplied by Messrs. McKie & Baxter, Glasgow. On her trials the yacht was exposed to a very heavy storm, and proved her good sea-going qualities. She steamed at about 9½ knots over the whole distance. Colonel Crichton placed the order for the vessel with Messrs. McKie & Baxter, who commissioned Messrs. Forbes to build the hull.

TYNESIDE AND WEARSIDE.

(*From our Own Correspondent.*)

Tyneside.

WORK continues to be very brisk in this district, and if there is no trouble in the labour world it will be a record year in the shipbuilding industry on this river.

Messrs. Armstrong, Whitworth & Co., Ltd., have both yards fully employed building warships for the British and Foreign Governments, in addition to which they have also passenger and cargo boats in hand.

Messrs. Swan, Hunter & Wigham Richardson, Ltd., are very busy, both with new and repair work. All their berths are occupied, and they have in hand extensive repairs to the steamer *Enosis*, which has sustained considerable bottom damage. They are also engaged re-boilering and re-classing the steamers *Tamboo* and *Cromarty*, and re-classing the steamers *Medomsley* and *Cairnloch*. Very extensive alterations to the Russian training ship *Grand Duchess Marie Nicolaevna* are also in progress.

Messrs. Palmer's Shipbuilding & Iron Co., Ltd., have a very large amount of work on hand; both yards are fully occupied, besides a good deal of repair work. The engine-

works are also working at full pressure, and have work in hand to last them for many months.

Messrs. John Readhead & Sons, Ltd., have all their berths occupied with new work; they also have a lot of repair work in progress.

The Wallsend Slipway & Engineering Company are very busy, and, amongst other work, they have received orders for machinery and boilers for new battleships building in the Government dockyards for the British Admiralty.

Messrs. Smith's Dock Co., Ltd., still continue to be very busy. The recent fogs have been responsible for causing a lot of work. The Dutch steamer *Dordrecht*, which is very much damaged about the bows, is now on their pontoon for repairs and the Spanish steamer *Junio* which was in collision with that vessel, is lying alongside waiting for repairs. They have also secured the contract for repairs to the French steamer *Rapide*, which is due in the Tyne and is now in charge of tugs.

Messrs. R. & W. Hawthorn, Leslie & Co. have a considerable amount of work on hand, amongst which is a lot of work for the British Admiralty, consisting of machinery and boilers for new battleships building in the Government dockyards.

Messrs. Brigham & Cowan are very busy with repair work, their dry docks being kept well occupied. They have in hand the steamer *Saxholme*, being repaired, after fire damage, which she sustained at New Jersey, when the steamer *Dunholme* was destroyed by explosion.

Wearside.

Work is still plentiful in the shipbuilding yards and engineering works on the river. Negotiations are taking place between Messrs. Brigham & Cowan, of South Shields, and the River Wear Commission, from whom Messrs. Brigham and Cowan are desirous of renting land with a view to constructing a large graving dock, capable of accommodating vessels of a good size. It is also intended to build a deep-water quay about 600 feet long.

Messrs. William Doxford & Sons, Ltd., are very busy indeed, having all berths fully occupied, and are working at full pressure in the engine-works; they have also a lot of repair work on hand.

Messrs. John Dickinson & Sons, Ltd., are working night and day on engines for ships building on the river, and have work in hand to last them a considerable time.

Messrs. S. P. Austin & Son, Ltd.—This Company is finishing the new steamer *Cove* alongside their quay, and by the time these lines appear in print she will be engaged in her work of carrying coals to London, for which trade she was designed, and the deadweight will be large, *viz.*, 4,250 tons. The following vessel, for Messrs. Wm. Cory & Son Ltd.'s coal trade, is being plated, and the frames are being turned for a collier for other London owners. The Company is reported to have contracted to build a steamer of 2,800 tons deadweight on account of the Pelton Steamship Co., Ltd., of Newcastle-upon-Tyne, for their coal trade. Repairing work has been small in extent, owing to the continued good employment at high rates of freight, making owners reluctant to stop their vessels unless absolutely necessary. A large Newcastle steamer has been pontooned to have new bilge keels fitted, and a Glasgow vessel, the *Invergyle*, was recently pontooned to have bottom plates renewed in consequence of grounding at Archangel. Some unimportant jobs, including painting, have been done during the month, and there are several vessels booked which are expected during the next few days for docking and repairs.

Messrs. MacColl & Pollock, Ltd., still continue to be very busy and are building engines for ships in course of construction on this and other rivers, also abroad.

Messrs. Osbourne, Graham & Co.—Work is still very plentiful with this firm, and it is their intention to launch, in a few days, a high-class steamer of about 2,400 tons deadweight for M. Fernand Bonet, of Caen. The berth will be immediately filled up by another steamer, their No. 168. They have also at present under way a "Monitor" vessel, which they hope to launch next month. This greatly depends on the way in which they get in their material. They have also another "Monitor" steamer on the stocks, and a special collier for French owners.

The Sunderland Shipbuilding Co., Ltd., are very busy, and have all berths occupied. They have work in hand to last them for some months to come.

THE TEES AND HARTLEPOOLS.

(From our Own Correspondent.)

Middlesbrough.

Messrs. Sir Raylton Dixon & Co., Cleveland Dockyard, continue to be as busy as ever. Amongst the new orders they are reported to have secured the order to build a medium sized cargo steamer for early delivery for the Austrian Levant Line, and which will be engined on the Tees.

Messrs. W. Harkess & Sons have plenty of old and new work in hand, and are likely to secure the order for a small steamer that is in the market.

Messrs. Richardsons, Westgarth & Co. are busy in every department, but are handicapped for want of material. They are reported to have secured the contract to supply the machinery of about 2,000 i.h.p., for a steamer building locally, presumably Messrs. Sir Raylton Dixon & Co. They are also busy in their speciality department, which now includes accumulators.

Messrs. Smith's Dry Dock Co., South Bank, have a large quantity of both old and new work in hand. They are reported to have secured the contract to build a small steamer to be engined locally, presumably by Messrs. Richardsons, Westgarth & Co., of about 800 i.h.p.

Stockton and Thornaby.

Messrs. Craig, Taylor & Co. have sufficient work on hand to keep them busy for nearly a year.

Messrs. Richardson, Duck & Co. are expecting to book an order for a medium-sized cargo steamer.

Messrs. R. Ropner & Sons are reported as being about to lay down a cargo steamer for their own account to be engined by Messrs. Blair & Co.

Messrs. Blair & Co. are very busy, and have booked several orders to engine vessels building locally, also a set of machinery for a vessel to be built at West Hartlepool, a repeat of an order for a West Hartlepool firm of shipowners.

West Hartlepool.

Messrs. W. Gray & Co., Ltd., continue as busy as ever at both the old and new yards, and during the month are reported to have secured the order to build a large cargo steamer for foreign owners.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Ltd., Harbour Dockyard, have secured the order to build a cargo steamer of about 7,500 tons deadweight for Messrs. G. Pyman & Co., similar to the s.s. *Marmion*, recently launched from this yard. She will be supplied with engines and boilers, presumably by Messrs. Blair & Co., Stockton.

Hartlepool.

The Central Marine Engine Works of Messrs. W. Gray & Co. are extremely busy in every department. They are to supply the engines and boilers for the cargo steamer to be built by this firm.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Middleton Yard, are working at full pressure on both old and new work, and are reported to have secured the contract to build a cargo steamer for local owners of about 7,000 tons deadweight. Great inconvenience is experienced over the delivery of material.

Messrs. Richardsons, Westgarth & Co., Ltd., have suffered a great loss in the death of their Chairman, Baron Furness, of Grantley, who died during the month. He was one of the greatest pioneers of industry of recent years; his business connection being so extensive and influential will no doubt materially affect the prosperity of the port. During the month Messrs. Richardsons, Westgarth & Co. have secured the contract to supply the engines and boilers for a large cargo steamer to be built by the Antwerp Shipbuilding and Engineering Co. They are also very busy in their speciality department.

THE HUMBER AND DISTRICT.

(From our Own Correspondent.)

Hull as an Oil Centre.—An important development in the import trade of Hull is an undertaking by the North-Eastern Railway Company to construct, at Saltend, an oil harbour

with a jetty running out into the river 1,500 ft., to enable the largest type of tank steamer to come alongside at any state of the tide. At Hull, at the present time, large depots are available at which petroleum can be discharged from vessels in the Albert Dock. About 120 acres of land will be available at Saltend for the storage of petroleum, etc., which will have river, rail and road connection. The most modern facilities will be provided for dealing with the oil, and for its distribution. The Humber Conservancy Board have given permission to carry out the necessary dredging. Saltend is just below the new docks that are under construction, and which will be opened during the latter part of 1913.

Humber Tunnel.—The Right Hon. T. R. Ferns, M.P. for Hull, has again voiced the matter of tunnelling the river Humber to the Lincolnshire side. This question has been in abeyance for the last thirty years, but there is no doubt this undertaking would cause a great opening out of the coal industry of the Midlands and the iron trade, and enormous developments would take place in the shipping business of the port.

Grimsby.—The trade of the port is fairly well maintained at present. The Bill now before Parliament for the new Fish Dock has been read for the second time, and is receiving the support of the member for Grimsby, Sir Charles Doughty, M.P.

Hull and Australia and South African Ports.—The Hull Chamber of Commerce is still advocating a direct line of steamers to ply between Hull and Australian ports, and this object is receiving much support in Australia, the contention being the great advantages of cheap rates to the Northern and Midland towns, for butter, fruit and wool. About forty Chambers of Commerce, including Sheffield, York, Leeds, Huddersfield, etc., are advocating a direct line of steamers to the South African ports, and the chairman of the Hull Chamber has approached Sir Owen Philips, of the Union Castle and Royal Mail Steam Packet Company, who has promised serious consideration of the whole matter. Further, an interview was obtained with Sir Richard Solomon, High Commissioner for the South African Government, and Mr. Cheappini, the Trades Commissioner, both of whom expressed themselves to be in hearty sympathy with the movement.

Quick Coaling.—Two cases of very smart coaling have recently been accomplished at the Albert and Wm. Wright Docks of the North-Eastern Railway Company. On the 9th November, s.s. *Ludworth* was loaded with a cargo of coals consisting of 1,683 tons of cargo, and 41 tons of bunkers, work being commenced at 1-45 p.m. and finished five hours later. The rate of shipment equalled 345 tons per hour. The *Ludworth* was loaded on account of Messrs. A. Lutze and Co. The s.s. *Brentwood*, loading on account of Messrs. W. Cory & Sons, commenced at 7-30 p.m. and was finished at 2 a.m., 1,548 tons of cargo, and 73 tons of bunkers being shipped; the actual time of loading was 5½ hours, and the rate of shipment equalled 295 tons per hour.

Messrs. Earle's Shipbuilding & Engineering Co., Ltd., are keeping fairly busy with new work, and are well employed with general repair work. On Saturday, 16th November, the s.s. *Portsea* proceeded on her trial trip, and gave every satisfaction to her new owners, The Sea Steamship Co., Ltd., Hull. Her sister-ship, the s.s. *Withernsea*, has just arrived after a maiden voyage from the Mediterranean, and has given a very good account of herself. These two steamers are built to Lloyd's highest class, and to Board of Trade requirements. Both steamers are managed by the well-known steamship owners and brokers at Hull, Messrs. Brown, Atkinson & Co., and were built under the supervision of Mr. Jenkins, of Messrs. Jamieson & Taylor, consulting engineers, Hull.

Messrs. Cooper & Co., Ltd., engineers and ship repairers, have had a very busy month with repair work, notably the s.s. *Glenroy*, which was run into off Alexandra Dock, in the Humber, on making her departure for London to finish loading for the Far East. She was run into by a Dutch steamer, but the *Glenroy* was able to get alongside the dock. Salvage pumps were got to work, and she eventually entered the Alexandra Dock. Messrs. Cooper & Co., working night and day, made her seaworthy for the passage to London. The s.s. *Professor Berys* is undergoing a heavy repair through sea damage, new rudder and propeller, and deck repairs being required. The outside staff of this firm is well employed on general overhauling work, and the branch shop at Alexandra Dock is busy. The head works, at Neptune St., have plenty of repair work. Other departments are busy, and the Company's graving dock is well booked up.

Thomas Tate, engineer and boilermaker.—This establishment is fairly well employed with repair work, and opening out for surveys, etc.

Messrs. C. D. Holmes & Co., Ltd., engineers and boilermakers.—All departments are employed at full pressure on new and repair work, and orders for boilers and machinery for trawlers and drifters are being booked. The branch shop at Alexandra Dock is very busy on local and outside steamers, opening out for Lloyd's surveys, and the Company's patent trawl winch is in great demand for all new fishing vessels, and the outlook is good for a long time ahead.

Messrs. Amos & Smith, engineers and boilermakers.—All departments are very busy, and the machinery is running night and day to compete with the orders in hand, yet still orders are being booked for engines and boilers for trawlers, etc. Orders for machinery have been booked that will keep the firm at work well into the latter part of next year. The branch shop at Alexandra Dock is fairly well employed with repair and graving dock work for local and outside steamship companies.

The Central Dry Dock Co., Ltd., have plenty of work in hand, and the *Tynedale*, of Belfast, is now in the Alexandra Dock, completing repairs of a very extensive nature. The s.s. *Farnham*, of Sunderland, is in graving dock, undergoing extensive repairs to her bottom. The s.s. *Hatasu* has been in dry-dock undergoing repairs to her bottom, the vessel having been ashore in the Baltic. During the month the Company have had ten steamers in their own and the public graving docks, besides smaller jobs on ships afloat in docks.

Messrs. Woodall & Co., engineers and boilermakers.—This firm have had sundry repairs on many steamers, and are completing several orders for the L.C.C., also forgings for sterns and rudder posts for several small shipyards.

Messrs. Stewart & Craig, engineers and ship repairers, have been very busy during the month, executing a great amount of repair work on deck and engine-room on the following steamers, s.s. *Vally*, s.s. *Valkyrian*, s.s. *Hercules*, s.s. *Ella*, s.s. *Jessie*, s.s. *Julius Cæsar*, s.s. *Ormiston*, s.s. *Izastor*, etc.

Messrs. North-East Coast Engineering Works (Hull), Ltd., have been well employed on the following steamers: s.s. *Corinth*, s.s. *St. Ninian*, s.s. *Baron Polwarth*, s.s. *Vermot*, s.s. *Fox*, s.s. *Hawthorn*, and steam tugs *Chester*, *Powerful* and *Winchester*, and sailing ship *Eliza and Alice*. The *Corinth* has had her condenser, engines and boilers opened out for Lloyd's survey, and sundry deck repairs. The *Baron Polwarth* has been dry-docked and sundry repairs executed. Each tug-boat has had new funnels and other repairs, the sailing ship new bulwark rails and damage repairs executed on account of collision.

Messrs. Cochrane & Sons, Ltd., shipbuilders, Selby, have booked orders for trawlers and coasters well into the latter part of next year. There are now in the Hull docks several vessels fitting out with boilers and machinery, preparing for trial trips.

SOUTH OF ENGLAND AND THE ISLE OF WIGHT.

(*From our Own Correspondent.*)

Messrs. Simpson, Strickland & Co., Ltd., Dartmouth, South Devon.—This firm have recently booked several orders for steam boats, including two each for the Chilian and Brazilian Governments. They are also busy on two 50-ft. steam pinnaces for the British Admiralty. A 45-ft. steel motor barge has just been completed, and the four 30-ft. steam launches mentioned in last month's notes have been despatched to Liverpool for the White Star Company. A large number of other boats are in hand, among which may be mentioned two very high-class yachts' launches to be fitted with enclosed triple engines and oil-fired boilers.

New Passenger Service.—The Hamburg-American line have decided to commence a new service between Hamburg and Boston, and Southampton is to be included in the itinerary. The steamers *Cleveland* and *Cincinatti* will inaugurate the service and it is stated that in 1914 the new steamers *Amerika* and *Kaiserin Auguste Victoria* will be transferred to this service. This will be possible, as by that date the Company will have three 50,000 ton steamers of the *Imperator* class in their New York service. The sailings will commence in May next, and will be for passengers only, as far as Southampton is concerned. Plymouth is to be the homeward port of call.

Messrs. Day, Summers & Co., Ltd., Northam Ironworks, Southampton. The new steam yacht *Jason*, which the firm are building for Mr. Frank Bibby, is nearing completion, and it is expected she will be ready for handing over by the end of this month. The 70-ton tug boat building for Messrs. Liebig & Co. has been running trials and is nearly ready for handing over. No new orders of importance have been booked during the past month, but the steam yachts *Conqueror* and *Boadicea* are at the yard for reclassification at Lloyd's, which will necessitate extensive overhaul.

Messrs. J. Samuel White & Co., Ltd., East Cowes, Isle of Wight.—Last month the boilers and machinery of the Chilian destroyer *Iomé* were lifted aboard, and the work of fitting is making good progress. The first of three pinnaces for the Japanese Navy was delivered to Barrow during November, also a 45-ft. admiral's steam barge, the second of three for the British Admiralty, was delivered to Portsmouth. The work on the two British destroyers is proceeding rapidly; both vessels were in frame last month, and the shell plating was well advanced. The keel of the third Chilian destroyer was laid during the month. Work generally was somewhat retarded owing to a strike of shipwrights.

Messrs. John I. Thornycroft & Co., Ltd.—Satisfactory progress continues to be made with the work on the following destroyers:—H.M.S. *Hardy*, *Paragon*, *Porpoise*, *Unity*, *Victor*, *Daring* and *Dragon*. H.M. tugs *Sturdy* and *Strenuous*. —The former vessel was successfully launched on the 12th of last month, and the *Strenuous* will be launched early this month. The shallow draught ferry steamers have been dismantled, and will shortly be shipped. Work on the Diesel-engined yacht continues to make satisfactory progress. Passenger and cargo steamer for Trinidad.—The shell plating of this vessel is nearing completion. The composite cargo vessel for Peru is in frame, and the shell is well advanced for the motor passenger vessel for New Zealand. The keel blocks were laid last month for the two lightships building for Trinity House. The material is being delivered for the Canadian Customs cruiser. The usual amount of general engineering work and repair jobs has been dealt with during the past month.

THE THAMES.

(*From our Own Correspondent.*)

The Thames Ironworks Co.—An offer is understood to have been made for this business as a going concern for the sum of £300,000, and that this amount has been questioned by Mr. Arnold Hills, the chairman of the Company, is scarcely to be wondered at. This gentleman has presented a petition in the High Court against the sale on behalf of the first Mortgage Debenture holders, and says that last year, without stocks and stores, a valuation was made at £800,000 as a going concern, and there the matters remains for the present.

Shipping Companies.—The P. & O. Company's new boat, the *Benata*, 11,120 tons, was recently launched from the builders' yard at Greenock. She is the third vessel of a new class of five steamers known as the "B" class, projected for the P. & O. branch line, by which a three-weekly service is maintained for one class of passenger at third-class rates between London and Australia, *via* the Cape. The line was formerly known as Lund's Line, and was acquired by the P. & O. Company three or four years ago. By the completion of these five new boats, the units of this fleet will have been doubled in number and the tonnage increased from 29,000 to 85,000 tons. This Company will give more liberal contributions for cadets entering the training ship *Worcester* next year by paying the full fees for such cadets, instead of the one half, as their previous custom has been.

Thames Lightermen's Monopoly.—This matter, which first came prominently to attention during the recent dock strike, has now come to the front again for settlement. It will be remembered these men claim a custom by which they form really a close corporation by the licences they hold. There has been considerable diversity of opinion on the subject, and the Board of Trade, having to approve the Port of London Act, has, in view of the important issues involved, decided to order a public enquiry to decide if the monopoly is to continue. The members of the committee appointed are Sir Robt. Romer, G.C.B., the Hon. R. E. Beckett and Alderman Thos. Smith, J.P.

National Sea-Training Conference.—The third conference on this matter has been held at the County Hall, Spring Gardens, under the Presidency of Alderman G. Drage, who was supported by Lord Brassey, the Duke of Somerset and Lord Devonport. All the speakers were in favour of British as against foreign seamen. In the end a resolution was passed that education authorities should make grants for the promotion of sea training. Shipowners present said they were anxious to give preference to boys who had some preliminary training.

Thames Bridges.—After negotiations extending over three years, the City Corporation have accepted the tender of Messrs. Sir W. Arrol & Co., Ltd., for the rebuilding of Southwark Bridge. The cost is supposed to be about £300,000, and the work will be commenced immediately. The bridge will be widened to the width of Queen St. Place, and the gradients will be reduced by several feet. A great public improvement will then be effected. Four years will be taken in completion. A proposal is made by the County Council to reconstruct Lambeth Bridge, and they will go to Parliament next year for this purpose.

Thames Naval Volunteers.—The annual inspection of this body recently took place, and a very good report was made. There are 1,000 members, and, besides a training ship on the river, the Corps possesses a drill hall of spacious dimensions, and sends some of its members to sea in our battleships. The London division appears to be in a very flourishing state indeed, and a good report was made as to efficiency.

MERSEY AND MANCHESTER SHIP CANAL.

(*From our Own Correspondent.*)

WHILE no new tonnage has been placed, great activity prevails upon contracts in hand.

Messrs. Cammell, Laird & Co.—Great interest centred in the launch of the Norwegian Atlantic liner *Kristianiafjord* for the Den Norske Americalinje, Christiania, which took place from the Tranmere yard of Messrs. Cammell, Laird & Co. on Saturday, November 23rd. This vessel, and her sister-ship, the *Bergensfjord*, are twin-screw vessels, and are intended to establish a high-class service between New York and Christiania. Some interesting particulars of these steamships are:—Length, 510 ft.; breadth, 61 ft.; depth to shelter-deck, 40 ft. 6 in., with a sea speed of 16½ knots. Quadruple-expansion engines of about 8,500 i.h.p. total will be supplied with steam by eight single-ended boilers fitted with Howden's forced draught. These are the largest mercantile vessels yet launched from this yard for the Atlantic passenger trade. The meat barge *Doon* is expected to be launched about the end of the year, being now partly plated. This vessel is intended for the dead meat trade, and is building to the order of the Pacific Steam Navigation Company, and is slightly smaller than her sister-ship, the *Dart*, which recently left for the River Plate. The British India Company recently placed an order for ten barges, to be shipped in plate and angle to India, where they will be built up with teak wood. Orders for this class of craft are always on the books, a great number having been built. The Isle of Man express steamer is partly plated, while the machinery is well advanced. Special interest attaches to this vessel, since it

is to have twin screws driven by geared turbines. H.M. destroyer *Garland* is now being plated, the engine seatings being well advanced. The machinery is being supplied by Messrs. Parsons; the boilers, which were sublet by the latter firm to Messrs. Hawthorn, Leslie are now in the yard awaiting shipment on board. The 32,000-ton floating dock recently delivered at Portsmouth dockyard has successfully fulfilled the lifting test imposed by the Admiralty, H.M.S. *Monarch* being successfully lifted on October 31st. The Australian cruiser *Melbourne* left for the Clyde for trials on October 29th, and returned to Birkenhead on November 9th, having passed successfully through exhaustive tests. A speed of about 26 knots was obtained, it is understood. H.M.S. *Audacious* has now most of her machinery on board, and is being closed up, while the machinery for H.M.S. *Iron Duke* is also being rapidly completed for shipment to Portsmouth. Mr. G. J. Carter, who recently left Newcastle for Birkenhead, took up the duties of managing director with Messrs. Cammell, Laird & Co. on October 30th. Presentations were made to both Mr. and Mrs. Carter from the staff at Elswick before leaving. The most important repair contract which has been in hand for some time is the Norwegian steamer *Lovstakken*, which grounded in the Mersey and was refloated. The boilers are shored up, while a great many plates are being renewed in the ship's bottom, sides and deck about midships.

Messrs. H. & C. Grayson.—An interesting contract recently executed by this firm has been the fitting up of the tug *Cernicola* for special duty in Mexican waters. This vessel, previously known as the *Flying Kestrel*, was purchased by Messrs. S. Pearson & Sons, of London, from the Alexandra Towing Company. Her bunkers have been altered to carry oil fuel, while the boilers have been fitted with the Wallsend Howden oil-fuel gear. Two 20-ton evaporators, a Hall's CO_2 machine, and a complete electric installation, including wireless and a searchlight, has been fitted. This unique craft will act as tender to oil steamers owned by Messrs. Pearson, the oil being loaded by means of pipes on the bottom two or three miles from the Mexican shore. An interesting attempt to retain the services of the sailing vessel has been made by Messrs. Job Bros., of Liverpool. Messrs. Grayson were entrusted with the fitting of an auxiliary oil motor into the barquentine *Earlshall*. A 120 B.H.P. two-cycle, direct reversible engine with cylinders $14\frac{1}{2}$ in. by $16\frac{1}{2}$ in. stroke has been fitted, burning 8·7 gallons of crude oil per hour at 275 revolutions. A single stage air compressor is fitted on the forward end of the engine, which delivers air into three containers. The compressor and engine are water-jacketed. A speed of 5 to 6 knots is obtained fully loaded. The *Earlshall* is engaged in the dried fish trade between Newfoundland and South America.

Messrs. Abdela & Mitchell.—At the Dee shipbuilding works of this firm the stern-wheeler *Broughton* has been launched for Messrs. John Holt & Co., for service on the West African rivers. Her length is 70 ft. by 16 ft. beam and with a draught of only 30 inches. Both hull and machinery have been built by this firm under the superintendence of Messrs. A. C. Hay & Smart, of Liverpool. A deck of teak is fitted, upon which the steering gear is placed forward, while excellent accommodation is provided for the agent, officers and engineers.

The Kermode Liquid Fuel Co.—An order has been placed with this firm by a Liverpool steamship company for an oil-burning outfit for a powerful tug for South America, to be fitted abroad. An installation of their patent pressure jet system has recently been installed for the Imperial Russian Government.

Liverpool Engineering Society.—The first meeting of the thirty-ninth session of this Society was held on November 6th, when Mr. Willett Bruce, the retiring President, presented the society with an official crest. The crest embodies emblems of the various branches of engineering, and bears the date of the foundation of the Society, *viz.*, 1875. An address was given by the President for the ensuing year, Professor Watkinson, of Liverpool University, upon "Oil *versus* Steam Engines." Incidentally great stress was laid upon the need of national technical training.

The Manchester Ship Canal. While the traffic returns for the past nine months show an improvement, it is expected that extra expenses due to the Insurance Act and outlay on new works, will ensure a disappointing result financially. The nine months' traffic returns are £411,860, as against £398,970 for the same period last year. A slackening off in traffic with the Near East has been felt, due to the war, while an increase in the amount of cotton, also grain and timber, has taken place. An interest of £160,000 per annum has to be met on the Manchester Corporation Loan of £5,000,000. Important additions are about to be made to the transit accommodation, and no effort will be spared by the Directors to maintain Manchester as a seaport which now ranks as fourth in the United Kingdom.

Messrs. Clover & Clayton.—Fire destroyed an extensive oil, paint and lamp store situated between two dry docks at this firm's Birkenhead yard on November 4th. The Birkenhead Fire Brigade localized the outbreak, and subdued it in thirty minutes.

The Canadian Pacific Railway Co.—It is stated that this Company has definitely decided not to operate steamers through the Panama Canal. Traffic from the west will be carried over their Trans-Continental Line to eastern ports, and there dealt with by their Atlantic steamers. All the "Empress" boats will be retained on the Pacific, together with two new steamers now building on the Clyde. The only Canadian Company who has decided to run steamers through the canal is the Canadian Northern.

Canadian Harbour Improvements.—In connection with the shipment from eastern ports in Canada it may be of interest to note that gigantic docks are contemplated in several seaports. Montreal is to spend a further £1,200,000 during the next three years in harbour improvements, besides the new floating dock built by Messrs. Vickers. The Canadian Government has offered Sir John Jackson the contract for the construction of the dry dock at Quebec, which will be 1,150 ft. long, 137 ft. wide and 37 ft. deep, and will cost, without buildings and repair plant, £500,000. This dock will be the largest similar structure in the world. £6,000,000 is to be spent by the Nova Scotia Government at Halifax to improve the port and harbour. New docks a mile and a half in length, comprising six piers 1,250 ft. long and 300 ft. wide, with railway tracks and new station, and with accommodation for at least thirty steamers, making Halifax second only to Montreal as an Atlantic port. St. Johns, N.B., is making good progress with the reconstruction of its harbour and breakwater, which is to be 4,750 ft. long. Berths for twenty-four steamers up to 800 ft. long are to be provided. The C.P.R. Grand Trunk and Intercolonial Railway Companies are interested in the construction of warehouses.

The Cunard Co.—An order for a large steamer has been placed by this Company with Messrs. Scotts, of Greenock. This vessel will have twin-screw and will be larger than the two vessels now building for the same Company in this yard. This vessel will be the largest vessel built on the lower reaches. The *Lusitania* is now in Messrs. John Brown & Co.'s hands, having met with a serious accident to one of the turbines while approaching New York. Several trips have been made without the use of this turbine.

NORTH-WEST OF ENGLAND.

(*From our Own Correspondent.*)

Barrow.—Shipbuilding was never so brisk in Barrow as it is at the present moment, and the firm of Messrs. Vickers, Ltd., never had so many orders on the order sheets. These include a super-"Dreadnought" for the British navy, the *Delhi*, a Turkish battleship, *Mehmed Reshad V.*, for the Turks, a battle-cruiser for the Japanese Government the *Kongo*, three monitors for the Brazilian Government, two protected cruisers of the "Town" class for Great Britain, a small oil-driven despatch boat for the Admiralty, an 8,000-ton oil-driven oil cargo boat for the Admiralty, to carry oil out to battleships of all sorts to sea, thirteen submarines for the Home Government, and an airship to take the place of the wrecked vessel which was first built here. In addition to this long list of orders, the firm have a deal of work in hand in the engineering department, in the shape of marine steam engines of great aggregate power, oil-driven engines for various vessels, gun-mountings not only for vessels building at Barrow, but others building in other yards, together with projectiles, limbers, gun carriages and other features in connection with the requirements of the army

and navy. In fact, the firm is fairly well full up with orders, and yet it is quite on the cards they will before long add very considerably to their commitments. Of course, a big and well-fitted-up yard such as that at Barrow needs a deal of keeping going, and the firm seem to be in the position to get orders from all sorts of sources.

Heavy-Oil Engines.—Great attention is being devoted at present to the designing and building of heavy-oil engines at Barrow. There is no doubt that this class of engine is likely to be largely adopted for the propulsion of ships of war and commercial vessels as well. The experiments carried on for some years past by Messrs. Vickers, Ltd., have led to the adoption of some very important types of engines. These have been thoroughly proved as to efficiency in the yard, and the firm is now building some engines of greater power, as well as others for ships of small tonnage. The firm have already in hand heavy engines for two or three large vessels, and they are also building heavy-oil engines, which have been proved a great success in the submarines under construction for the British navy. Further developments are promised in this department of engineering before long.

Submarines.—In September, and again in October, Messrs. Vickers, Ltd., launched the *E3* and the *E6* submarines, which are quite the most up-to-date craft for sub-aqueous operations, either in a harbour or in the open sea. Altogether there are thirteen submarines building at Barrow for the British Admiralty, and three of these are of a different type from those yet built here.

Work in Progress.—There is a very great deal of work in progress at the Barrow yard, and in all directions it is seen that the vessels in hand are week by week and month by month getting further forward towards completion. Quite a large army of skilled and unskilled men are at work on the various ships on the stocks. The Turkish battleship *Mehmed Reshad V.* is showing a vast advance, although it has been rumoured she was likely to be bought by some other Power from Turkey, which Power, under new conditions, might not require delivery. At any rate these rumours have not resulted in any change in ownership so far as is known in Barrow, and the work of construction is going on steadily, not only as regards the hull, but her engines and auxiliary machinery as well. The British "Dreadnought" *Delhi* is also making very marked progress, and work has been commenced on the three Brazilian monitors and on the two British armoured cruisers of the "Town" class. The arrangements for laying the keel of the Admiralty oil-tank steamer have been made. This vessel is of 8,000 tons, and will be driven by oil engines of Messrs. Vickers' design. The engineering works of Messrs. Vickers, Ltd., are extremely busily employed, and there are plenty of orders, not only for marine engines, but for gun-mountings and other products of this very large department.

Shipbuilding Material.—The cost of shipbuilding material is very firm, and makers of ship and boiler plates are fully sold forward. Ship plates are at £8 5s. per ton and boiler plates £9 per ton.

Hæmatites.—There is continued activity in the hæmatite iron trade, and prices are very firm at 86/6 for maker's iron nett f.o.b., and 83/6 warrant iron sellers. Makers anticipate a continuous good trade for another twelve months.

Strike.—A strike of boilermakers occurred at Messrs. Vickers' yard on November 21st on a question of certain work being done by engineers which was the work of the boilermakers. Some 1,600 men struck work, but the grievance was promptly settled and the men returned to work after a day's idleness.

BELFAST.

(*From our Own Correspondent.*)

Messrs. Harland & Wolff.—The fitting-out of the Royal Mail Steam Packet Company's new twin-screw steamer *Darro* has been completed, and the vessel left Belfast on 31st October. The *Darro* is 517 ft. long; beam, 62 ft., and gross tonnage about 11,500. She is one of the batch of sister-ships built, and building, at the Queen's Island for the Company's intermediate passenger service to South America. Another of these vessels is at present fitting out and will shortly be ready for sea, as will also the Elder Dempster liner *Abosso*. In addition to the immense volume of new tonnage under construction at the Queen's Island, Messrs. Harland & Wolff have given out orders for the building of new steamers to the Clyde and other shipbuilding centres. In the irontoundry they have in hand a number of turbine casing castings for Clydebank. They also made the *Aquitania's* turbine casing castings. There is a considerable amount of repair work in the port more than there has been for some time past—and Messrs. Harland & Wolff have a big share of this. They have the *Olympic*, the Hamburg America liner *Hamburg*, and Lord Pirrie's steam yacht *Valiant*. The big White Star liner is at present in the new graving dock, where she will remain for a considerable time; the *Hamburg* is in the Alexandra graving dock, having had a new stern frame fitted; and the *Valiant* lies in the Hamilton graving dock. The last-named vessel is being subdivided into a greater number of water-tight compartments, in addition to which a promenade deck and a topgallant forecastle are being added.

Messrs. Workman, Clark & Co. have a fair amount of new tonnage at the fitting-out wharves, and every berth in both yards occupied. They also have a good deal of repair work in hand. The overhaul and alterations on the Lamport and Holt liner *Veronese* are of a very extensive nature, and big engine repairs are being carried out on Messrs. Clark and Service's *Ardandearg*.

The Harbour.—An agreement has been come to between the Harbour Commissioners and the Belfast City Council with regard to the reclamation of the slob-lands lying between the Twin Islands and Holywood, and a Parliamentary Bill is to be proceeded with. It is intended, in the first instance, to construct a sea bank extending from the East Twin Island to the Kinnegar at Holywood. When, at some time in the future, this foreshore is filled in, a vast tract of land will be available for shipbuilding and other purposes. The Harbour Commissioners invited tenders for the reconstruction of their 100-tons crane, the collapse of which was referred to in the October issue of "The Marine Engineer," but the work is such that very few firms appeared to care to undertake. A tender from Messrs. Sir William Arrol is under consideration, and the Commissioners have also in view the provision of a new electrically-driven 100-tons crane. The old crane was quite out of date, and it is to be hoped that the harbour authorities will eventually decide on a new crane.

Dublin.—The Dublin Dockyard Co. recently launched a cargo coasting steamer for the Sligo Steam Navigation Co. The new vessel will shortly be towed to Belfast to receive her machinery, which has been built by Messrs. MacColl & Co.

Londonderry.—The North of Ireland Shipbuilding Co. have started operations with several important orders in hand, and contracts for other vessels are likely to be fixed with them shortly.

LETTER TO THE EDITOR.

To the Editor of THE MARINE ENGINEER & NAVAL ARCHITECT.

RE EXPERIMENTAL TANK.

Sir,—Whilst thanking Mr. Howes for his suggestion, I am afraid I cannot agree with him. Since the same amount of water passes the plate in every case, the inertia (? mass) must be the same also. The resistance depends on *the manner* in which this liquid gets round the plate—on the amount of pressure it produces, both on the anterior and posterior surfaces.—Yours faithfully,

R. DE VILLAMIL.

Carlisle Lodge, Rickmansworth, Nov. 20, 1912.

MESSRS. W. SISSON & CO., LTD, have recently issued a well-illustrated catalogue dealing with their specialities.

TECHNICAL BOOKS.—The publishers wish to remind readers of this journal that they will be pleased to procure and despatch books to any part of the world on receipt of order.

THE MANUFACTURE OF IRON.—On November 4th Mr. Percy P. Dowden read a very interesting paper on the above subject, before the Institute of Marine Engineers.

The Late Lord Furness

FIRST BARON OF GRANTLEY.

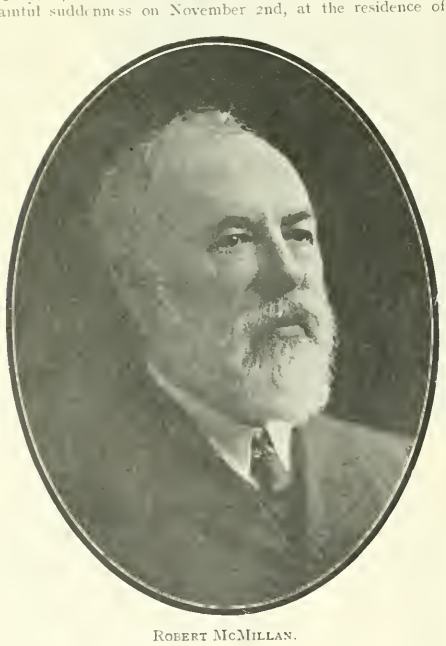
WE record with the deepest regret the death of Lord Furness, which took place at Grantley Hall, Ripon, on November 10th, after a serious illness, which has extended over some months past, and the progress of which was such that the news of his death was not altogether unexpected. Christopher Furness was the seventh son of the late Mr. John Furness, of West Hartlepool, and was born at that place in 1852, so that he has passed away at the comparatively early age of sixty-two. His position as one of the most famous shipowners that this country has ever possessed sprang from very small beginnings, and was due to his remarkable business acumen and his untiring energy. His wonderful commercial career was started under his brother in the firm of Messrs. Thomas Furness & Co., produce merchants, of West Hartlepool, and while in Sweden for the firm in 1870, he appreciated that a large proportion of foodstuffs imported in the north of England came from Hamburg, and that in the event of France and Germany going to war, this port would be closed. On the declaration of war, being in Gothenburg, he bought large quantities of produce, and, as a result, the firm made a very handsome profit on the transaction. This instance not only showed his foresight, but also his spirit of masterly activity and resource, even at the early age of eighteen. So large was

the firm's business with America that they acquired an interest in a number of sailing vessels, and, in 1874, acquired their first steamship. It is said that they were the first to own steamers specially constructed for conveying live cattle and frozen meat cargoes from Canada and the United States. In 1876, Christopher Furness started as a shipowner on his own account, and the business has so developed that the firm of Messrs. Furness, Withy & Co. are listed as actually owning sixty-nine steamers of an aggregate gross tonnage of 200,000, and, in addition, control fifty-one steamers of an aggregate gross tonnage of 190,000, belonging to other fleets. It was only quite recently that Lord Furness acquired a large interest in the Houlder Line of steamers. His association with Messrs. Richardsons, Westgarth & Co., and many other large firms, is only another indication of his remarkable business capacity, holding, as he did, the position of chairman in at least sixteen commercial concerns. It has been stated that in 1907, when he celebrated his silver wedding, he was the head of thirteen large businesses, with an aggregate capital of eleven millions, of which he owned more than a quarter. He was knighted in 1895 by Queen Victoria, and was raised to the peerage in 1910, to mark the high esteem in which he was held, not only for business capacity, but also for his great generosity and charity. It may be mentioned that not only did he give £20,000 as a pension scheme for aged mariners, but in July last he promised to give £10,000 if the shareholders of Messrs. Furness, Withy and Co. would vote £10,000 for training youths under expert tutors before entering the service of the Company as apprentices in steamships. He is succeeded in the title by his only surviving child, the Hon. Marmaduke Furness, born in 1883.

OBITUARY.

Robert McMillan.

WITH regret we have to place on record the death of Mr. Robert McMillan, principal of the firm of Messrs. Archibald McMillan & Son (Ltd.), of the Dockyard, Dumbarton. The sad event took place with painful suddenness on November 2nd, at the residence of the deceased, Methlan Park, Dumbarton. On the previous day he was at business as usual, and also paid a visit to Glasgow. He was in his sixty ninth year, and was of the third generation of McMillans who have actively engaged in the shipbuilding industry since 1834. His grandfather, Archibald McMillan, in the year stated, founded the firm, which is the oldest by about ten years of the existing shipbuilding firms in Dumbarton. The business was, at first, carried on in two separate building yards further up the Leven than the premises now occupied. Here they built upwards of fifty vessels of various sizes, varying from coasting vessels up to ships of from 380 to about 600 tons register. The skill with which the work entrusted to the firm was accomplished, led to such an influx of orders that in 1846 they found it necessary to look out for larger premises, and in this year they acquired the dockyard fortunately then vacant. Immediately on taking possession, they set about increasing the size of the tidal dock and acquiring adjacent ground. About 1870 they relinquished the building of wooden vessels entirely, and devoted themselves to iron shipbuilding. In 1854 the founder died, and the business was then carried on by his son John McMillan till 1868, when he took into partnership his two sons Robert and John. The latter died in 1889, and since then Mr. Robert McMillan—who is now succeeded by his eldest son, Mr. Wm. McLeod McMillan—has been at the head of the business. In the days of the sailing ship the McMillan firm had a very high reputation for the construction of this kind of vessel. On three separate occasions they built the largest sailing ships of their day; in 1868 the *Peter Stuart*; in 1873 the *Thomasina McLellan*; and in 1874 the *Stuart Hahneman*. In 1877, Mr. John McMillan, Junr., designed and his firm built the clipper ship *Coriolanus*, noted for beauty of form and swift passages, and in the same year, a model, closely following on the lines of this vessel, was entered at the Competitive Exhibition of Ships' Models, held at the Fishmongers' Hall, London, under the auspices of the Worshipful Company of Shipwrights. This model obtained first prize, which consisted of a gold medal, together with 25 guineas, the freedom of the Worshipful Company of Shipwrights and the freedom of the City of London. Steadily devoting themselves to iron shipbuilding, and, from time to time, making extensions and improvements in their works—the firm being the first in Britain to apply hydraulic power to the riveting of iron ships—they have more recently specialized in large cargo-carrying steamers, some of the latest being built on the Isherwood longitudinal system. Mr. Robert McMillan was of a retiring disposition and did not identify himself actively with any societies for the professional advancement of shipbuilding. He is survived by his widow and a family of sons and daughters.



ROBERT MCMILLAN.

John William Shepherd.

With regret we place on record the death of Mr. John William Shepherd, who, until the early part of this year, was managing director of the London & Glasgow Engineering and Iron Shipbuilding Company, Ltd., Govan, and Lancefield, Glasgow. When Messrs. Harland & Wolff, of Belfast, took over the Company's works early this year, Mr. Shepherd retired from business. For some little time previous to this he had been in failing health, owing largely to ailments supervening on an attack of enteric fever. Although benefiting from his retiral his indisposition returned, and on November 24th he passed away while in a private nursing home in Glasgow, aged sixty-eight years. Deceased had a long and very varied experience as a shipbuilder, his early training having been obtained in Sheerness Dockyard, whence he passed into the service of the Deptford Green Shipbuilding & Engineering Works, on the Thames, and, in 1866, joined the staff of Messrs. J. & W. Dudgeon. In 1870, when Sir Edward Reed resigned his position of Chief Naval Constructor to the Admiralty, and became head of Messrs. Earle's Shipbuilding Co., at Hull, he engaged Mr. Shepherd to take a leading position in the yard, where a large amount of important work was produced under his control. In 1873 he became general manager at Messrs. Robert Napier and Sons, Govan, where he remained until the death of Mr. Robert Napier and the sale of the works, after which he became associated with the Orient Steam Navigation Co. As naval architect and surveyor for this Company he designed the *Orient* and *Austral*. Both these vessels were built at

John William Shepherd

the Fairfield works, then carried on under the designation of Messrs. John Elder & Co., and with Mr. (afterwards Sir) William Pearce at the head of affairs. Requiring the services of a naval architect able to relieve him of the practical charge of the shipyard, he persuaded Mr. Shepherd to accept the position. Mr. Shepherd held this important post for a number of years, and, upon severing his connection with this Company, he was appointed to the management of the London and Glasgow Engineering & Iron Shipbuilding Co., Ltd., and in that capacity he found scope and outlet for that energy which always distinguished him. He was a member of the Institution of Naval Architects, and a Fellow of the Royal Society, Edinburgh. Mr. Shepherd was a man of much independence of character, and was not bound by conventional limitations. He held very decided opinions on subjects connected with his profession, and gave fearless expression to his ideas, at the same time winning the respect of those who might differ from him. His demise is regretted by shipbuilders and engineers, not only of Clydeside, but of the whole country, and even wider afield.

REVIEWS.

Lessons in Mechanics for Marine Engineers and Engineering Students. By A. N. Somerscales. Messrs. Murray & Co. 3/6 nett.

This book contains a digest of lectures delivered and lessons given at the classes of the Hull Technical Institute, and, in the form now published, will be found of some value to the young marine engineer, and profitable to those who are somewhat rusty and desirous of polishing themselves up in first principles. The early chapters are devoted to explanations of elementary expressions and terms, which almost seem unnecessary in these days especially, when the taxation for teaching the young idea how to shoot, bulks so heavy. Possibly the amount of cramming at the ordinary day school throws into an insignificant corner the real object of teaching, *i.e.*, to give a thorough grounding in the rudiments and to develop, by discipline, the thinking and reasoning faculties, as in the old grammar schools. Probably the author has found a fair percentage of apprentices and young engineers who are backward in what ought to be school work, and has thus found it necessary to include a rudimentary section. As the book proceeds the chapters open up views of details which every engineer ought to know and study. The lessons conveyed are clearly expressed, and the papers set at the end of the book are on useful and practical subjects; the answers being given, the student is able to check his working and results. While there are a few definitions which might be more fully expressed for the sake of clearness, the book, on the whole, contains information and enunciations clearly and concisely given for the benefit of young engineers, especially of those who have neglected early opportunities and desire to make amends by study.

Propellers. By Cecil H. Peabody. New York: Messrs. John Wiley & Sons. London: Messrs. Chapman & Hall, Ltd. Price 5/6 nett.

This book has been written to give a reliable and convenient method of designing propellers, based on model experiments, and free from theoretical intricacies and uncertainties. The basic experiments are those detailed in the book on naval architecture by the same author. A number of tables are given for two, three and four-bladed propellers, from which the dimensions of a propeller may be readily determined, without interpolation, when the power, speed and revolutions are assigned either to give maximum efficiency, or to conform to certain restrictions, such as limited draught. The use of the projected contour and area of the blades is suggested for drawings and calculations for propellers, and tables are included to facilitate the obtaining of exact results in a quick manner. One of the most interesting features of the book is the detailing of methods for determining the power required to propel a ship at a given speed, together with data for various types of ships and boats, including many well-known vessels. Although this work adds another to the many works written on the subject, there is much in it which tends to induce different views from those put forward time after time by some authors in the past, and one is led to think that much profit will result from a careful study of the subject from the author's point of view.

The Gas Turbine. By Hans Holzworth, and translated by A. P. Chalkley, B.Sc. (Lond.), A.M.I.C.E., A.I.E.E. London: Messrs. Charles Griffin & Co., Ltd. Price 7/6 nett.

This work is mainly a history covering the systematic investigation of the problems involved in the construction of a gas turbine, and the practical results obtained after a period of research extending over three years. The book is divided into four parts, comprising the theory of the gas turbine, the construction of the gas turbine, the general comparison of the gas turbine with the reciprocating gas engine, and the results of tests on the original turbine and on the first turbine used for driving purposes. The turbine itself is operated by periodical combustion, with means for cutting off the combustion chamber from the exhaust side leading to the rotor during the greater part of the charging step with combustible mixture, the closing of the combustion chamber on the admission or charging side during the combustion and expansion period, and, lastly, the scavenging of the combustion chambers with air during the interval between the individual explosions. This sets out broadly the features of the turbine concerned, one which has been developed entirely in Germany by German enterprise. To those who are interested in this branch of thermo dynamics the book should not only prove interesting, but should be of the greatest value in indicating what practical experiment has demonstrated as the line to be followed to attain successful results, as well as what to avoid in order to obviate failure or low thermodynamic efficiency. The illustrations given, although not of constructive details, enable the reader to appreciate the reasoning employed to justify the course of procedure, and the whole work is indicative of the thoroughness which characterizes the work of the German scientist. The work, as a translation, is a result of which the translator may be proud, and on which he can be justly complimented.

LAUNCHES AND TRIAL TRIPS.

LAUNCHES—English.

Herakles.—On October 15th, Messrs. Wm. Doxford & Sons, Ltd., launched from their yard at Pallion, the s.s. *Herakles* built to the order of Messrs. Brunsgaard, Kiosterud & Co., Drammen. The dimensions of the vessel are:—Length, 402 ft.; breadth, 54 ft.; moulded depth, 27½ ft. Deadweight capacity, 8,500 tons. During construction, the vessel has been superintended by Messrs. Bushell, Nicol & Co., Newcastle, and Mr. B. Steinert. The classification is with the British Corporation, and Norwegian Veritas Societies. The engines and boilers are being supplied by Messrs. Doxford.

Cove.—On October 24th, there was launched from the shipbuilding and repairing establishment of Messrs. S. P. Austin & Son, Ltd., Wear Dock Yard, Sunderland, the steel steam collier *Cove*, of 4,250 tons deadweight capacity, to the order of Messrs. Wm. Cory & Son, Ltd., of London, the twenty-sixth vessel constructed for the same owners. She has been built under Lloyd's special survey for 100 A1 class, with large hatchways specially adapted for the owner's coal trade, and ample water-ballast capacity. Accommodation for captain and officers is fitted in the poop, engineers in houses on after end of bridge and crew in the forecastle. The machinery, of large power, will be supplied by Messrs. Geo. Clark, Ltd., of Sunderland, and the vessel will be one of the largest engaged in the coal trade. The construction of the vessel has been superintended by Mr. Sydney Alder, on behalf of the owners, and the launch was successfully carried out in the presence of a number of friends, the christening ceremony being gracefully performed by Mrs. Wm. Valder, of Beechwood, Croham Park Avenue, Croydon. Messrs. Wailes, Dove & Co.'s "Bitumastic" covering has been applied to the tank top under main boilers and stokehold.

Fotis.—On October 24th, Messrs. Robert Thompson & Sons, Ltd., launched from their Southwick Yard the first-class finely-modelled cargo steamer *Fotis*, built for foreign account. Her principal dimensions are:—Length overall, 365 ft. 6 in.; breadth, 50 ft. 10 in.; depth moulded, 24 ft. She takes the highest class at Lloyd's, and is of the single-deck type, with a full poop, cargo bridge amidships, 215 ft. long, and topgallant forecastle, where the crew are comfortably berthed. Ample water-ballast is provided in the cellular bottom and fore and after peaks. A large deep-water ballast tank is also fitted abaft the engine-room bulkhead. The cargo holds, clear of all obstructions, are divided by a centre longitudinal bulkhead, with six cargo hatchways, having double derricks fitted on tables with crosstrees at masthead, also derrick posts to poop and bridge hatches, all arranged for rapid loading and discharging, and worked by powerful steam winches. A large multitubular donkey boiler of ample capacity will supply steam to deck machinery. Accommodation is provided in a large steel house on the bridge for the captain, steward, spare room, officers' messroom and dining-saloon, the latter being tastefully fitted up in oak. Spacious rooms for the engineers, officers and petty officers, with messroom, bathroom, etc., are situate in steel houses at the side of the engine casing. The engines, by The North-Eastern Marine Engineering Co., Ltd., Sunderland, have cylinders 24½ in., 40 in. and 66 in., with a stroke of 45 in., steam being supplied by large boilers working at a pressure of 180 lbs. per square inch.

Portsea.—On October 24th, Messrs. Earle's Shipbuilding and Engineering Co., Ltd., launched from their yard the handsomely-modelled single-screw steamer *Portsea*, built to the order of The Sea Steamship Co., Ltd., Hull, for their general trade. The principal dimensions are:—Length, 352 ft.; breadth, 49 ft. 6 in. moulded; depth, 24 ft. 3 in. moulded. She has been constructed of steel to Lloyd's 100 A1 class (single-deck rule) to the Board of Trade latest requirements, including grain certificate, also to French, Italian and Suez Canal certificates, and is designed for carrying a large quantity of water-ballast in the cellular double bottom and peak tanks. A deck-house has been provided amidships for the accommodation of captain, officers and stewards, having a combined chart room and wheel-house overhead. The engineers are berthed in side-houses abreast the engine casing, and the petty officers, seamen, and firemen under the forecastle deck. The vessel will be fitted with two steel masts having telescopic wood pole for Manchester Ship Canal requirements, three steel derrick posts, each complete with wood derricks and all necessary cargo gear for rapid loading and discharging. There are eight powerful steam winches, patent direct-acting steam windlass and steam and hand-steering gear. The machinery consists of a set of triple-expansion engines, having cylinders 24 in., 39 in. and 66 in. diameter by 45 in. stroke, steam being supplied by three single-ended cylindrical boilers working at a pressure of 180 lbs. per square inch.

Pen Cw.—On October 24th, there was launched from the yard of Messrs. Jos. T. Eltringham & Co., South Shields, a steam paddle tug and passenger tender of special design, which is being constructed to the order of the Great Western Company for service at Fishguard. During construction the vessel is being superintended on behalf of the owners by Mr. Chas. T. Ramsay, marine superintendent, Liverpool, who was also present at the launch. Messrs. Wailes, Dove & Co.'s "Bitumastic" cement has been applied to the flat of bottom and their patent "Bitumastic" enamel to the floors, etc.

Emil L. Boas.—On October 25th, Messrs. Swan, Hunter and Wigham Richardson, of Wallsend, launched the t.s.s. *Emil L. Boas*, which they have built for the Hamburg-Amerika Line. The vessel is a sister-ship to the *Karl Schurz* (see Trial Trips), and is named *Emil L. Boas* after the late chief representative of the Hamburg-Amerika Line in New York, who died recently. The construction of the *Emil L. Boas* has been under the superintendence of the owners' resident inspectors, Mr. Claus Hatje and Mr. J. Dircling. The chief dimensions of the ship are 425 feet long overall, 51 feet broad and 33 feet deep. The deadweight carrying capacity will be about 6,100 tons. The twin-screw engines, and also the boilers, are being built by the Wallsend Slipway and Engineering Co. The ship is designed to carry seventy first-class passengers and also cargoes of fruit. Electric lighting will be installed and also apparatus for receiving and transmitting radiograms. Messrs. J. & E. Hall, Ltd., of Dartford, are supplying the refrigerating machinery. Messrs. Robson & Sons, of Newcastle-on-Tyne, have in hand the upholstery and the furniture, all of which will be most handsome and comfortable. The music-room, dining-saloon and smoke-room will be luxurious apartments. Special attention is being given to the free ventilation of all parts of the ship. The state-rooms for passengers will be unusually lofty and most comfortably furnished.

City of Marseilles.—On October 26th, there was successfully launched from the Jarrow Shipyard of Messrs. Palmer's Shipbuilding & Iron Company, Ltd., the twin-screw passenger steamer *City of Marseilles*, which has been built to the order of the Ellerman Lines, Ltd. The vessel is about 485 feet long and is to be classed 100 A1 at Lloyd's. First-class accommodation is arranged on the boat, bridge and upper decks in two and three-berth cabins for 159 passengers. The dining-saloon will seat 138 persons. Second-class accommodation is provided in the poop at the fore end for fifty passengers, with dining-saloon to seat forty-six persons. The whole of the passenger accommodation is admirably designed, and all the cabins take their light and ventilation from the ship's side. The vessel is to be fitted by the builders with twin-screw quadruple-expansion engines, steam being provided by four main and one auxiliary boilers.

Salamanca.—On October 26th, there was launched at Sunderland the screw steamer *Salamanca*, for Messrs. Henry Scholefield & Son, of Newcastle. She is of the single-deck type with poop, bridge and forecastle, and perfectly clear holds, to carry 5,500 tons deadweight on a light draught. The engines will be fitted by the North-Eastern Marine Engineering Company, Ltd., at their Sunderland works. Messrs. Wailes, Dove & Co.'s "Bitumastic" enamel has been applied throughout the bunkers, the engine and boiler-room tanks, and their patent "Bitumastic" covering to the tank tops.

Aeon.—On October 26th, Messrs. Sir Raylton Dixon & Co., Ltd., launched from their Cleveland Dockyard, Middlesbrough, a fine steel screw cargo steamer which they are building to the order of Messrs. Howard, Smith & Co., Ltd., of Melbourne, Australia, for their extensive business in the Antipodes. The vessel is of the builder's latest improved type of cantilever construction, with top-side water-ballast tanks. She is of the single-deck, shelter-deck type, and is being constructed under Special Survey to class 100 A1, Lloyd's. Her principal dimensions are:—365 ft. by 50 ft. 6 in. by 24 ft. 6 in. moulded,

and she will have a carrying capacity of about 6,200 tons on a light draught of water. A large stool house on shelter deck, amidships, will contain saloon, spare room and accommodation for chief officer, steward, etc., with captain's room and chart-room above, on top of which will be the flying bridge. The officers and engineers will be berthed in side-houses on shelter-deck, abreast engine casing, while the seamen will be berthed in the forecastle and the firemen aft, being provided with messrooms, wash-houses and a hospital. The vessel will be fitted with a complete installation of electric light, arc lamps, cargo clusters, etc., and will have Wilson-Pirrie steering gear with telemotor control, also hand screw gear. She will have four holds clear of obstructions, widely spaced tubular pillars being fitted, five hatches, two masts, and a very complete equipment for working cargo, comprising thirteen derricks, including one for 15 tons, and four gaffs, seventeen powerful steam winches, including one for warping and four MacFarlane's patent winches, and all other latest and most modern appliances for rapid loading and discharging. The propelling machinery is being constructed by Messrs. Richardsons, Westgarth & Co., Ltd., Hartlepool, and consists of quadruple-expansion engines of the balanced type, with three large single-ended boilers working at 220 lbs. pressure to Board of Trade requirements The cylinders are 24 in., 34 in., 48 in. and 69 in. diameter by 45 in. stroke, the high pressure and first intermediate being fitted with piston valves and the second I.P. and L.P. with double-ported slide valves and balance pistons. Both the main and auxiliary condensers are of the "Contraflo" type, the former being built of steel plates and attached to the centre back columns. For circulating water through the tubes, an independent centrifugal pump is provided, and feed pumps are also of the independent slow-speed type, the feed water being heated in a Morison surface-feed heater. The installation of auxiliaries is very complete, there being two large ballast pumps, and in addition to the general service pump there is a fresh-water and sanitary pump; the evaporator is of the Morison Radial type, and the auxiliary Contraflo condenser is fitted with an oil separator and independent pumps. The propeller is of solid manganese bronze. In the stokehold a Crompton silent ash hoist is fitted, also Diamond Blowers for cleaning the boiler tubes.

Inglemoor.—On October 26th, the steel screw cargo steamer *Inglemoor* was launched from the works of the Blyth Shipbuilding and Dry Docks Co., Ltd. This vessel, built to the order of Messrs. Walter Runciman & Co., Newcastle-on-Tyne, has been constructed to Lloyd's highest class under Special Survey, and her dimensions are :—378 feet overall, by 51 feet extreme breadth, by 28 feet 0 inches depth moulded. She is of the single-deck type, with topgallant forecastle, bridge amidships and full poop aft. Accommodation for officers will be provided in deck-house on bridge, with a house for the captain on top of deck-house, the engineers' accommodation being at sides of casing, and the crew will be berthed in topgallant forecastle. The steamer is specially adapted for the general cargo and wood trade, and shifting boards are fitted throughout for carriage of grain. Efficient deck machinery of the best and latest design, including five 6 in. by 10 in. and three 7 in. by 10 in. steam winches, will be supplied for the quick and economical working of cargoes. Triple-expansion engines, having cylinders 26 in., 42 in. and 70 in., by 48-in. stroke, will be fitted by Messrs. Blair & Co., Ltd., of Stockton.

Oaklands Grange.—On October 28th, the Northumberland Shipbuilding Company, Ltd., Howdon-on-Tyne, launched the finely-moulded steamer *Oaklands Grange*, which has been built to the order of Messrs. Furness, Withy & Co., Ltd., West Hartlepool, for the Houlder Line, Ltd., London. The vessel is 397 ft. long by 52 ft. beam by 29 ft. 6 in. deep, of the single-deck type, and has been built under special survey to the highest class at British Corporation. She is fitted with long bridge, poop and topgallant forecastle. There are ten steam winches by Messrs. Clarke, Chapman & Co., Ltd., a large number of cargo derricks, and steam windlass by Messrs. Emerson, Walker & Thompson Bros., and the usual water-ballast arrangements for light passages are fitted. The machinery will be supplied by Messrs. Richardsons, Westgarth & Co., Ltd., consisting of engines with cylinders 25 in., 40 in. and 68 in. by 48-in. stroke, three large boilers with 180 lbs. pressure. The vessel will carry about 8,000 tons on a light draught and steam about 10 knots loaded at sea.

St. Leonard.—On October 28th, there was launched from the shipyard of Messrs. Cochrane & Sons, shipbuilders, Selby, a handsomely-modelled, steel screw trawler, the principal dimensions being :—135 ft. long, 23 ft. beam, and a depth of 13 ft. The vessel has been built to the order of the Grimsby Victor Steam Fishing Co., Ltd. The machinery and boiler will be supplied by Messrs. C. D. Holmes, of Hull, consisting of triple-expansion engines with cylinders 13 in., 23 in. and 37 in. diameter, and 24-in. stroke. The vessel is to be replete with all the latest improvements for fishing purposes, including electric lighting to fishing, masthead and side lights, and a battery of accumulators, so that the lights can be used when the dynamo is stopped. The electric light is being installed by Matt Jennison, A.M.I.Min.E., electrical engineer, Grimsby.

F. A. Tamplin.—On November 6th, there was launched from the Hebburn yard of Messrs. Palmer's Shipbuilding and Iron Company, Ltd., the oil tank steamer *F. A. Tamplin*, built to the order of Messrs. T. W. Tamplin & Co., London. The vessel is 350 ft. long and will carry about 5,600 tons deadweight. She has been built to Lloyd's highest class. The oil compartments are divided into seven pairs of tanks, there being two cofferdams and pump-room on the aft side of the bridge with entrance from upper decks. The oil tanks are arranged below the main deck, with trunk built the whole length of tanks between the upper and main decks. The vessel is to be fitted with triple-expansion engines by the Palmer Company, steam being supplied by two large boilers fitted for burning oil.

Grena.—On October 29th, Messrs. Wm. Doxford & Sons, Ltd., launched from their yard at Pallion, the s.s. *Grena*, built to the order of J. Ludwig Mowinckel, Esq., Bergen. The dimensions of the vessel are :—Length, 465 ft.; breadth, 57 ft.; moulded depth, 36 ft. Deadweight capacity, 11,000 tons, and gross register 6,400 tons. Particular attention has been given to the accommodation of the officers and crew. The crew have the exceptional privilege of separate rooms containing two beds; this applies to the sailors and firemen, the former being in the forecastle and the latter in the poop. There are also special messrooms and washhouses, etc., for each section of the crew. The classification is with the Norwegian Veritas. The christening of the vessel was pleasingly performed by Mrs. Olsen, wife of the Commander.

Herbert G. Wylie.—On November 7th, there was launched on the Tyne a screw tank steamer for the carriage of petroleum in bulk. The vessel has been built to the order of the Mexican Petroleum Company, and is of the following dimensions :—Length overall, 373 ft.; breadth, extreme, 50 ft. 2 in.; and depth moulded, 27 ft. 0 in. She is capable of carrying a deadweight of about 6,500 tons, and has been built under special survey to plans approved by Lloyd's Register for their highest class. The space between the petroleum compartments and the forepeak is arranged as a dry cargo hold with a deep ballast tank underneath. After the launch the vessel was taken to the works of the Wallsend Slipway and Engineering Company, Ltd., Wallsend, where she will be fitted with triple-expansion machinery, having cylinders 23½ in., 38½ in. and 64 in. by 45-in. stroke, steam being supplied by two single-ended boilers.

Boeton.—On November 7th, Messrs. William Gray & Co., Ltd., launched the handsome steel screw steamer *Boeton*, which they have built for the Netherland Steamship Co., Amsterdam. The vessel will take the highest class in Lloyd's Register, and is of the following dimensions, *viz.* :—Length overall, 412 ft. 6 in.; breadth, 53 ft. 6 in.; and depth, 29 ft. 7½ in. She is a handsomely-modelled vessel of the double-deck type, with complete shelter deck. The saloon, captain's, officers' and engineers' rooms, etc., will be fitted up in houses on the shelter-deck, and the crew are berthed in houses abreast the engine casing. The vessel has a cellular double bottom and after-peak tank for water-ballast, and in addition there is a deep tank or hold compartment fitted for water-ballast abaft the engine-room, giving a total capacity for water-ballast of about 2,100 tons. The whole of the outfit, including steam windlass, steam-steering gear, twenty-two derricks, and one heavy derrick to lift 30 tons, twelve steam winches with return exhaust to winch condenser of the "CMEW" type are of the most improved description. The engines are of the triple-expansion type, supplied by

The Central Marine Engine Works of the builders, having cylinders 28 in., 46 in. and 77 in. diameter, with a piston stroke of 48 in. and four large steel boilers adapted for 180 lbs. working pressure per square inch, and fitted with Howden's system of forced draught. A special feature in the boiler installation is the superheater, designed and made by the engine builders with a view of utilizing to the utmost the heat from the gases on their way to the funnel. Another feature of interest is the "CMEW" type of main condenser, which is designed to give a high vacuum in tropical waters. A special system of "CMEW" auxiliaries, including a winch condenser, will be installed in the engine-room.

Norrbotten.—On November 7th, Messrs. R. & W. Hawthorn, Leslie & Co., Ltd., launched from their yard at Hebburn a special type of ore-carrying steamer, 458 ft. by 63 ft. 3 in. by 34 ft. 6 in., having a deadweight of 11,500 tons, which is the third similar vessel constructed by these builders to the order of Messrs. Roderiaktiebolaget Lulea-Ofoton, of Stockholm. As the vessel left the ways she was christened *Norrbotten*, by Mrs. P. A. Welin, wife of the managing director of the shipowning company. The vessel is constructed with four double and four single ore pockets or holds on the Johnson-Welin self-discharging principle, instead of the usual holds. Between these pockets or holds discharging compartments are arranged, extending from the deck to the bottom of the ship, containing the chutes which deliver the ore by gravity into iron skips, thus affording economical loading and discharging. Eight hydraulic cranes are fitted on the deck to manipulate the skips, each being capable of dealing with a load of 4 tons. The holds and living spaces will be heated on the "Huvacumetto" patent system of heating, this being of specially large capacity under the hoppers, to prevent the ore from freezing in the pockets in the cold regions in which the vessel will trade. The vessel will be fitted with water-ballast tanks having a total capacity of about 3,640 tons. The crew are berthed in the forecastle, captain, officers, engineers and stewards aft, with accommodation amidships for captain's office, wireless operator, hospital, store rooms and chart room. The vessel is being built to the British Corporation's highest class, and in compliance with the Swedish law. The triple-expansion engines, having cylinders 27 in., 45 in. and 74 in. by 54-in. stroke, with three powerful boilers, are being constructed by Messrs. R. & W. Hawthorn, Leslie & Co., Ltd., at their St. Peter's Works.

Trevaylor.—On November 7th, there was launched from the shipbuilding yard of Messrs. John Readhead & Sons, Ltd., West Docks, South Shields, a steel screw steamer built to the order of Messrs. Edward Hain & Son, St. Ives, Cornwall, and named the *Trevaylor*. The dimensions of the vessel are :—381 ft. by 51 ft. by 27 ft. 8¼ in., and she carries a deadweight cargo of 7,650 tons on a light draught of water. She is of the improved single-deck type, to Lloyd's highest class, and under their special survey, having poop, extra long bridge, and topgallant forecastle, with deep girder framing, and cellular double bottom fore and aft, with large after-peak tank for water-ballast. Holds clear of beams and other obstructions. The outfit of the ship is very complete for general and grain trades, with shifting boards all fore and aft, and large hatchways as feeders. A full equipment of steam winches and derricks is fitted for the rapid loading and discharging of cargoes. The vessel will be fitted with triple-expansion engines, also constructed by Messrs. John Readhead & Sons, Ltd., having cylinders 26 in., 42 in. and 69 in., with 48-in. stroke, supplied with steam from two large steel boilers working at a pressure of 180 lbs. per square inch. This is the fifty-ninth vessel built for the above firm by Messrs. John Readhead & Sons, Ltd.

Tavian.—On November 7th, Messrs. Richardson, Duck and Co., Ltd., launched from their yard a steel screw steamer of the following dimensions, *viz.* :—Length overall, about 404 ft. ; breadth, extreme, 52 ft. 6 in. ; depth moulded to shelter deck, 35 ft. 8 in., with a deadweight carrying capacity of about 8,350 tons. This vessel, on the "Isherwood" system of construction, has been built to the order of Messrs. Owen & Watkin Williams & Co., of Cardiff, and will class 100 A1 in Lloyd's Register under special survey. She has two complete decks, *viz.* :—Shelter deck of iron and upper deck of steel, height between decks being 7 ft. 8 in. There are six extra large hatchways to expedite loading and discharging, the main hatch being 36 ft. by 24 ft. Extra large and roomy accommodation for captain, officers, engineers and apprentices is provided in steel deck-houses on shelter-deck, and petty officers and crew are berthed in shelter-deck 'tween decks aft. The vessel is fitted with a steel bulwark amidships from fore end of saloon house to after end of engineers' side-houses. A steel bulwark is also fitted from after end of fore hatch to stem. A cellular double bottom for water-ballast is fitted throughout. The vessel has also peak tanks, and the equipment includes six steam winches, derrick tables (forming houses for cargo gear) and cross-trees on masts, four derrick posts, twelve derricks, steam windlass with quick-warping ends, steam-steering gear, stockless anchors, and a good inventory and outfit. The engines, by Messrs. Blair and Co., Ltd., have cylinders 26 in., 42 in. and 70 in. by 48-in. stroke, steam being supplied by three extra large single-ended boilers having a working pressure of 180 lbs.

City of Bristol.—On November 8th, there was launched from the Wallsend shipyard of Messrs. Swan, Hunter and Wigham-Richardson, Ltd., the steamer *City of Bristol*, which is the fourteenth built by them for the steamship lines controlled by Sir John Ellerman. The *City of Bristol*, a powerful cargo ship, is to run in the Hall Line, of Liverpool, trading between the United Kingdom and the East Indies. Her leading dimensions are 465 feet long, 56½ feet wide, with a moulded depth of 34 feet. Her deadweight carrying capacity will be some 11,200 tons. She is being built to the highest class of the British Corporation. To ensure the rapid handling of cargo no fewer than sixteen derricks are provided. Some of these are placed on the masts and others on separate derrick posts. There is one heavy derrick to lift 30 tons, and the remainder have a capacity of from 7 tons to 10 tons. There are thirteen steam winches. The triple-expansion engines are being built by the Wallsend Slipway and Engineering Company, together with three large single-ended boilers, which are to work under a pressure of 220 lbs. per square inch. Wireless telegraphy is to be installed in the ship. In the poop on the upper deck there is roomy accommodation for seamen and firemen. Amidships, on the bridge deck, there are commodious cabins for engineers and officers, together with a small number of most comfortable state-rooms. The latter adjoin the dining-saloon, which has seating accommodation for sixteen persons.

Neptunian.—On November 9th, there was launched from the yard of Messrs. Cochrane & Sons, Ltd., Selby, a handsomely-modelled steel screw trawler, the principal dimensions being 135 ft. by 23 ft. 6 in. by 13 ft. 4 in. moulded. The vessel has been built to the order of The Neptune Steam Fishing Co., Ltd., of Hull, and will be replete with all the latest improvements for the fishing trade. She will be fitted with powerful triple-expansion engines by Messrs. C. D. Holmes & Co., Ltd., of Hull.

Lucellum.—There has just been launched at Sunderland the oil steamer *Lucellum*, which has been built to the order of Messrs. H. E. Moss & Co., of Liverpool, London and Newcastle, and transferred by them to the Lucellum Steamship Company, Ltd., of Liverpool, of which they are the managing owners. The vessel, which is 394 ft. long, has been designed to carry a deadweight cargo of 7,000 tons. She will carry all kinds of oil, but has been specially fitted out for creosote and fuel oil. For this purpose, all the oil tanks have been fitted with steam pipes for maintaining the creosote cargo at a suitable temperature. Two large horizontal duplex oil pumps of the latest improved type are fitted in the pump room. The bunkers are specially large, and are adapted for both coal and oil. The propelling machinery is of the triple-expansion type. The oil fuel apparatus, of Wallsend Slipway Company's latest pattern, is fitted to the main boilers, and also to the large auxiliary boiler.

LAUNCHES—Scotch.

River Orontes.—On October 23rd, there was launched at Greenock the steel screw cargo steamer *River Orontes*, which has been built to the order of the American Levant Line. The vessel, which is 390 ft. long, has a deadweight carrying capacity of 7,150 tons on 23 ft. draught. The naming ceremony was gracefully performed by Miss Thompson, sister of the managing director of the Company, and the vessel has been constructed to the rules of the British Corporation Registry.

Benalla.—On October 26th, the *Benalla*, a passenger steamer of 11,120 tons, constructed for the P. & O. Company's

branch line, was successfully launched at Greenock. This is the third vessel of a new class of five steamers known as the "B" class projected for the branch line, by which a three-weekly service is maintained for the conveyance of one class of passengers only at third-class rates between London and Australian ports, *via* the Cape. Messrs. Wailes, Dove & Co.'s "Bitumastic" enamel has been applied throughout the bunkers, etc., and their patent "Bitumastic" covering to the tank tops. The boiler and engine-room cases have been covered with Messrs. Matthew Keenan & Co.'s patent bulkhead insulation, and they have applied their non-conducting composition to the boilers, pipes and flanges throughout the vessel.

Ixion.—On October 29th, Messrs. Scott's Shipbuilding and Engineering Company, Greenock, launched the twin-screw steamer *Ixion*, of about 14,000 tons deadweight carrying capacity, which they have built for Messrs. Alfred Holt & Co., Liverpool. The vessel is 503 ft. in length, 60 ft. in breadth, and 42 ft. 6 in. in depth. She is a duplicate of the *Talthybius*, launched by the same Company last year, and is intended for passenger and cargo service to Australia and the Far East.

Itaquera.—On November 7th, there was launched at Govan the twin-screw mail and passenger steamer *Itaquera*, which has been built for foreign owners to the order of Messrs. John M. Campbell & Son, Glasgow. The vessel, which is intended for service on the Brazilian coast, is 300 ft. in length overall, 43 ft. in breadth, 19 ft. in moulded depth, and of about 2,000 tons gross. She will have accommodation for 120 first-class and 100 steerage passengers. Triple-expansion engines, designed to give a speed of 12 knots, will be supplied.

Canberra.—On November 9th, there was launched from the shipyard of Messrs. Alex. Stephen & Sons, Ltd., Linthouse, the twin-screw steamer *Canberra*, built to the order of The Howard Smith Co., Ltd., of Melbourne, for their passenger and cargo service on the Australian coast. The vessel's dimensions are:—Length, 410 ft.; breadth, 57 ft.; and depth, 42 ft., with a gross tonnage of about 7,700 tons. The *Canberra*, like the previous vessels built by Messrs. Stephen for the Howard Smith Company, is very elaborately fitted up throughout to carry a large number of first, second and third-class passengers, together with a small amount of cargo and some cattle. The cargo is handled by hydraulic cranes and derricks, as is usual on the Australian coast, and a portion of the holds is insulated and refrigerated for fruit or other perishable goods. The first-class passengers are accommodated on four decks amidships, with a large dining-saloon, a social hall and music-room, smoking-room with open verandah, bar parlour, ladies' room and children's saloon. An electric passenger hoist is fitted in the main staircase. The second-class accommodation aft is equal in every way to the first-class, being provided with similar state-rooms, a large dining-saloon, a music-room and smoke-room, but not so elaborately decorated. The third-class are arranged forward in state-rooms with large public rooms, a separate galley and pantry being provided for their use. The cooking appliances include everything to be found in the finest passenger liners, and amongst other fittings for the use and comfort of the passengers may be mentioned a large barber's shop, a dispensary, ventilation by electric fans and trunking throughout to passengers' quarters, a circulating system of hot water for lavatories, and a constant water supply to all state-rooms. The life-saving appliances have been specially considered and include a large motor lifeboat. All the boats are operated by means of Welin's davits, and fitted with the most approved form of disengaging apparatus. Wireless telegraphy is, of course, fitted, and the Clayton system for fire extinguishing and disinfection has been installed throughout. The propelling machinery, which is designed to give a speed of 16 knots loaded at sea, is also supplied by Messrs. Stephen, and consists of two sets of quadruple-expansion balanced engines, supplied with steam from six boilers.

Architect.—On November 12th, there was launched at Scotstoun the steamer *Architect*, of about 5,500 tons gross, which has been built to the order of Messrs. T. & J. Harrison, Liverpool. The vessel has been built to Lloyd's highest class, and is fitted with all the latest requirements for the rapid and efficient working of cargo. Triple-expansion engines will be supplied.

Queen Margaret.—On November 12th, there was launched at Port Glasgow a steamer of 8,500 tons carrying capacity which has been built for Messrs. Thomas Dunlop & Sons, Glasgow. The vessel is 405 ft. in length, 53 ft. in breadth and 30 ft. in depth, and she has been constructed to Lloyd's highest class. The vessel was named *Queen Margaret* by Miss Mary B. Dunlop.

Preesall.—On November 14th, Messrs. Wm. Simons & Co., Ltd., Renfrew, launched the *Preesall*, a twin-screw hopper steamer constructed to the order of the Lancashire & Yorkshire and London & North-Western Joint Railways, for Fleetwood Harbour. In accordance with the builder's well-known practice the vessel was launched complete with steam up ready for work. The *Preesall* is propelled by two sets of triple-expansion surface-condensing engines and two multitubular high-pressure steel boilers, easily capable of supplying engines with steam for a speed of 9 knots per hour. All the most modern auxiliaries are provided in the engine-room, including steam and hydraulic reversing gear, independent pumps, etc. A steam windlass is fitted forward and a steam capstan aft for warping purposes. The hopper for carrying the spoil is divided into compartments, and the discharge doors are controlled by steam appliances designed so that each compartment may be emptied independently of the others, or that all the compartments may be discharged at the same time. Roomy and well-ventilated cabins are provided for the accommodation of the officers and crew. The construction of the vessel, which is classed 100 A1 at Lloyd's, was carried out under the direction of Mr. Geo. Hughes, chief mechanical engineer to the Company, and Mr. W. Johnson, superintending engineer of the Company's engineering works at Fleetwood, assisted by Mr. D. Heggie, resident inspector.

LAUNCHES—Irish.

Kentucky.—On October 29th, Messrs. Workman, Clark and Co., Ltd., Belfast, launched from their South Yard a steamer built by them for Messrs. Bucknall Steamship Lines, Ltd. The ceremony of naming the vessel *Kentucky* was gracefully performed by Mrs. Rennie, the wife of H. Rennie, Esq., superintendent engineer for the owners. The *Kentucky* is 462 feet in length with a gross tonnage of about 6,600, and has been built under British Corporation Survey for the highest class in their registry. The vessel has five holds all practically free of obstruction and capable of receiving the largest type of consignment, such as locomotives, boilers, motors, etc. The hatchways to each of these holds are large and are equipped with steam winches, derricks and other appliances necessary for handling heavy cargo. The captain's and officers' rooms are placed in a steel house on the bridge deck, and the engineers in a deck-house amidships, while the crew are berthed in the poop. The propelling machinery consists of a set of quadruple-expansion engines having the necessary auxiliary appliances, supplied with steam from three single-ended steel boilers working under forced draught.

Sligo.—There has been launched at Dublin the screw steamer *Sligo*, which has been built for the Sligo Steam Navigation Co.'s cargo-carrying and live stock trade. The vessel, which is 182 ft. long, is of the long raised quarter-deck type, with machinery aft, and she has two large holds entirely free from obstruction. Powerful triple-expansion engines, designed to give a loaded speed of 11 knots will be supplied.

SIR DAVID GILL, the eminent astronomer, and a Past President of the Institute of Marine Engineers, presided at the annual dinner of the London Dollar Academy Club, held on November 22nd. The toast of "The Academy," proposed from the chair, was accepted by Mr. W. H. Raeburn, who gave some interesting reminiscences of past and pleasant experiences of more recent times at Dollar. The guests, including the ladies, were welcomed in a good speech by Mr. W. Dollar. Dr. J. Mitchell Bruce responded. Dr. A. Morison proposed the health of the President in a delightful manner. The evening was brought to a close by the company joining in "Auld Lang Syne." Sir David Gill has agreed to give a paper on astronomy to the North-East Coast Institute of Engineers and Shipbuilders.

TRIAL TRIPS.

Innismurray.—The new motor coaster *Innismurray*, one of the fleet of vessels built, or building, for the Coasting Motor Shipping Company, Ltd., Glasgow, has run her trials on the Firth of Forth. The *Innismurray*, which was built at Alloa, is of 270 tons deadweight, and she had on board 240 tons of coal for Wick. On four runs over the Forth measured mile she attained a mean speed of 7·75 knots on a consumption of crude oil of about six gallons per hour. She also passed successfully through reversing, turning and steering trials, and throughout her semi-Diesel engine, made by Messrs. William Beardmore & Co., Dalmuir, worked in a thoroughly satisfactory manner. The vessel was proved to be extremely handy and well suited for the general canal and coasting trades. The classification is with the British Corporation Registry.

Natica.—On October 16th, the oil-tank steamer *Natica*, built at the Wallsend Shipyard of Messrs. Swan, Hunter and Wigham Richardson, Ltd., was taken to sea for steam trials, which were most successfully accomplished to the satisfaction of all concerned. The owners are the Anglo-Saxon Petroleum Company, Ltd., of London, and the vessel's first voyage will be to the East Indies. For Launch, see November issue.

Karl Schurz.—On October 19th, the new Hamburg-Amerika liner *Karl Schurz* was successfully tried at sea off the mouth of the river Tyne. This handsome vessel was launched with the name *Columbia*, which was subsequently changed to *Karl Schurz*, in honour of that extraordinarily gifted patriot, who was born in 1829 and died only some six years ago. When a University student he got into serious trouble with the Prussian Government, during the revolutionary movement in Germany in 1848. Indeed, he had to fly from the country as an outlaw with a price upon his head. After various vicissitudes, and earning a livelihood as a teacher in London and Paris, he migrated with his wife to the United States. He soon became embroiled in politics, in which he took a leading part. The question of the liberation of slaves was being hotly contested, and Karl Schurz warmly espoused the cause of their freedom. The strife that was engendered culminated in the disastrous civil war between the North and South. For a time Schurz left America as Minister Plenipotentiary of the United States in Madrid. The life of comparative inactivity did not suit him, and he took the first opportunity of returning to America, and flung himself with ardour into the cause of the Northern States. He was given a command in the army, and was soon made general of a division, acquitting himself with great credit. In after years he became a good deal immersed in literary work, and continued to take a leading part in American politics, being a great friend and ally of Abraham Lincoln and subsequent Presidents and statesmen. He was made a senator, and had he been born a citizen of the United States he might well have become President. The ship which has been called after this distinguished man is one of two twin vessels being built by Messrs. Swan, Hunter and Wigham Richardson, Ltd., of Wallsend-on-Tyne. In preparing plans of these vessels, the builders were materially assisted by Director Eggers, Mr. O. Rothardt, and Mr. Goos, of the technical staff of the Hamburg-Amerika Line. The construction of the vessels has been superintended by Mr. Claus Hatje, and Mr. J. Drieling, the resident inspectors; and also by Captain Porzelius, the commander of the vessel, and Mr. J. ten Hermsen, the chief engineer. The main propelling machinery and the boilers have been built by the Wallsend Slipway and Engineering Co., Ltd., and comprise twin-screw triple-expansion engines of the inverted direct-acting type, with two double-ended and two single-ended boilers, worked under Howden's forced draught. The chief dimensions of the *Karl Schurz* are 425 ft. long, with a breadth of 51 ft., and a depth of 33 ft., the deadweight carrying capacity being about 6,100 tons on a moderate draught. There is most luxurious accommodation for seventy or eighty passengers, and only of the first-class. The holds of the ship are insulated for carrying fruit, as it is intended that the ship is to trade between Hamburg, the West Indies, and South America. The refrigerating machinery has been supplied by Messrs. J. & E. Hall, Ltd., of Dartford, and is of their carbonic anhydride type. In addition to the fruit holds, the store-rooms for meat, vegetables, fish, wines, beer and aerated water will all be refrigerated. Electric light is installed throughout the ship, and also wireless telegraphy of the system controlled by Deutsche Betriebsgesellschaft für Drahtlose Telegraphie. The upholstery work and the fitting of the public rooms has been undertaken by Messrs. Robson & Sons, Ltd., of Newcastle-on-Tyne. At the forward end of the bridge deck there is a comfortable lounge, a beautiful compartment with walls finished white. The furniture, including book-cases, piano and oval tables, is of satinwood. The numerous easy chairs and kidney-shaped settees are upholstered in handsome tapestry. The floor is covered with a rich carpet of old-rose colour and trellis design. Near the lounge are a number of luxurious state-rooms. Three schemes of colour have been used in furnishing these apartments, namely, green, blue and old gold. The remaining state-rooms, though somewhat less luxurious, are lofty and extremely comfortably fitted. There are also some arranged in groups, so that family parties can have two or three cabins with communicating doors. The accommodation for the Captain and senior officers is quite as comfortable as that for the first-class passengers. Abaft the engine-room on the bridge deck there is a verandah café leading into the smoke-room, which is panelled and furnished in fumed oak. The settees in the bays round the room, and also the arm chairs are covered with leather of a rich green colour with antique finish. The floor is tiled with rubber of a grey and green design. Amidships is a gymnasium, replete with apparatus. On the shelter deck is the dining-saloon, which is finished in white and gold, with mahogany furniture. It is a handsome apartment extending from side to side of the ship, and also has windows looking forward. There is accommodation to seat eighty persons at a time, the tables being arranged for small separate parties. Instead of the old-fashioned chairs on a revolving stand, elegant mahogany arm chairs are provided. These are fixed to the floor with an adjustable chain and spring, allowing a certain freedom of movement. The floor is covered with a rich red carpet. Special attention has been paid to the commissariat department, and the catering will be carried out on that princely style for which the Hamburg-Amerika Line justifiably have a world-wide reputation. The galley, pantries, butcher's shop and bakery will be each fully equipped so as to adequately provide for the needs of the most fastidious of passengers. During the trial trip the owners were represented by Messrs. Rothardt, Goos, Kohler, Hatje, Drieling and Mussmann, Dr. Schulz and Capt. Lansky. Everything worked most satisfactorily to all concerned, and a mean speed of very nearly 16 knots an hour was attained, which is an excess of contract requirements. The trial trip was an exhaustive one, being carried on for six hours. Captain Porzelius then assumed command of the ship, with Mr. J. ten Hermsen in charge of the engine-room, and sailed for Hamburg.

Ebani.—On October 21st, the steel screw steamer *Ebani*, built to the order of Messrs. Elder, Dempster & Co., Ltd., for their African trade, at the Hebburn yard of Messrs. Palmer's Shipbuilding and Iron Company, Ltd., was taken to sea for her steam trials. The vessel, which is over 400 ft. long, with a cargo-carrying capacity of about 7,500 tons, has Lloyd's highest class, under shelter-deck rules. She has three complete steel decks fitted with full poop, bridge and forecastle, with passengers' deck, captain's deck and flying bridge over bridge deck. All weather decks are wood sheathed. On the shelter deck a steel house is fitted containing the dining-saloon, smoking-room, and stewards' quarters, and under the bridge there are cabins for a limited number of second-class passengers. Over the saloon-house on the passenger deck a number of rooms are fitted for first-class travellers, with handsome entrance hall and open-air lounge at aft end. The vessel, which has been fitted and furnished in handsome style, has triple-expansion engines 26 in., 44 in. and 74 in. by 51-in. stroke, steam being provided by three large boilers 205 lb. working pressure, with forced draught. The vessel was taken for several runs over the measured mile, and for a continuous run up and down the coast. The average speed attained was about 12½ knots, everything working very satisfactorily, and the vessel afterwards proceeded to Liverpool.

Thistleard.—On October 23rd, the steel screw steamer *Thistleard*, built by Messrs. Craig, Taylor & Co., Ltd., Stockton-on-Tees, to the order of The Albyn Line, Ltd. (Messrs. Allan, Black & Co., Sunderland, managers), was

taken to sea for her trial trip, which proved highly satisfactory. During the whole of the trip everything worked with the greatest smoothness, and on the run from Hartlepool Hengh to Souter point a speed of 13¼ knots was maintained, and those present were highly pleased with the ship and engines. Immediately after the trial the vessel proceeded to the Tyne to load, under command of Captain Beale. For Launch, see October issue.

Karpat.—On October 24th, this vessel was taken for her six-hour loaded trial, which, in spite of adverse conditions of sea and weather proved satisfactory and the vessel left on her maiden voyage on the 27th October. The vessel is constructed to Lloyd's highest class and to conform to the requirements of the Hungarian Government. For Launch see October issue.

Cururupu.—On October 25th, this vessel which has been designed and constructed by Messrs. James Pollock, Sons and Co., Ltd., of 3, Lloyd's Avenue, London, for Brazilian clients, ran her trial on the Firth of Clyde, with most satisfactory results, the speed obtained being nearly ¾ of a knot in excess of that specified. The *Cururupu* makes Messrs. Pollock's record for the Amazon over 150 vessels, including twenty-eight twin-screw craft. For Launch, see October issue.

Newfield.—On October 26th, the s.s. *Newfield* ran her official trial trip in Hartlepool Bay. Owing to the inclemency of the weather no speed trials were attempted, but an extended run was made along the Yorkshire coast, the machinery working splendidly. The vessel afterwards proceeded to Cardiff to load under the command of Captain Clarke. For Launch, see November issue.

Sturton.—On October 28th, the s.s. *Sturton*, built by Messrs. Ropner & Sons, Ltd., of Stockton-on-Tees, made her official trial trip in the Tees Bay, and behaved in a thoroughly satisfactory manner. The speed was very satisfactory, being over 11 knots. For Launch, see November issue.

Treglisson.—On October 30th, the new screw steamer *Treglisson*, built by Messrs. John Readhead & Sons, Ltd., West Docks, South Shields, to the order of Messrs. Edward Hain & Son, St. Ives, was taken to sea on her official trial trip. After the trial, which was in every way satisfactory to all concerned, the vessel proceeded to Tyne Dock to load for Port Said, under the command of Captain Richards. This is the fifty-eighth vessel built for the above firm by Messrs. John Readhead & Sons, Ltd. For Launch, see November issue.

Noya.—On November 1st, the s.s. *Noya*, built and engined by Messrs. Wm. Doxford & Sons, Ltd., Pallion, Sunderland, to the order of The English & American Shipping Co., Ltd., London, ran a successful fully-loaded sea trial, when a mean speed of 10¼ knots was obtained. For Launch, see November issue.

Denise.—On November 2nd, Messrs. Osbourne, Graham and Co. sent to sea for her official trial-trip the steel screw steamer *Denise*. After the trial, which was in every way satisfactory, the steamer proceeded to London on her first voyage. For Launch, see November issue.

Posillipo.—On November 4th, the large steel screw steamer *Posillipo*, built to the order of Messrs. Peirce Bros., Naples, by Messrs. David & William Henderson & Co., Ltd., Partick, underwent her trials on the Firth of Clyde. During the trials everything worked well and to the entire satisfaction of owners' representatives and builders. A mean speed of 13½ knots was easily attained on the measured mile. For Launch, see November issue.

Baron Vernon.—On November 6th, the new steamer *Baron Vernon*, built by Messrs. Archd. McMillan & Son, Ltd., Dumbarton, for Messrs. Hugh Hogarth & Sons, Glasgow, ran trials on the Firth of Clyde. The machinery was supplied by Messrs. Dunsmuir & Jackson, Govan, and a Cochran (Annan) donkey boiler, fitted with patent seamless furnace, has been supplied. On completion of the trials, which were in every way satisfactory, the steamer proceeded on her voyage. The classification is with the British Corporation Registry. For Launch, see November issue.

Fauvette.—On November 9th, the s.s. *Fauvette*—the latest addition to the fleet of the General Steam Navigation Company—left Middlesbrough to run her speed trials in the North Sea before being taken over by the owners. The engines, which were built by the North-Eastern Marine Engineering Company, Ltd., are of the triple-expansion type, with cylinders 28 in., 46 in. and 76 in. diameter by 48-in. stroke, supplied with steam by three large single-ended boilers. The machinery, which worked exceptionally well on the trial trip, gave the vessel a speed of 15·34 knots. Later the vessel left for London. For Launch, see September issue.

Wandilla.—The new twin-screw steamer *Wandilla*, built by Messrs. William Beardmore & Co., Dalmuir, for the Adelaide Steamship Co., South Australia, completed her official trials recently on the Firth of Clyde. A mean speed of 16 knots, under loaded conditions, was attained during the trials, which included a run of 100 miles at sea, and the vessel amply fulfilled all the conditions of the contract. The vessel, which is under command of Captain Sim, returned to Glasgow harbour, and she will sail as soon as possible with a full complement of passengers for Australia, calling at Plymouth for her South of England passengers. She is built to the British Corporation classification. For Launch, see July issue.

Chimera.—Trials have been run between Buchan Ness and Aberdeen by the steam yacht *Chimera*, which has been built for Colonel Sir H. Crichton, of Netley Castle, Netley Abbey. The vessel resembles a fishing drifter in design, but she is fitted out as a yacht, the idea being that she should stand all kinds of weather, which an ordinary yacht could not do. The *Chimera* is fitted up luxuriously. The saloon is in kauri pine, French polished, and all the fittings are of mahogany. The machinery, which is all above Board of Trade and Lloyd's requirements, consists of a pair of compound surface-condensing engines of 200 i.h.p. On her trials the yacht was exposed to a very heavy storm, and proved her good sea-going qualities. She steamed at about 9½ knots over the whole distance.

"NEPTUNE-DIESEL" ENGINES.

MESSRS. Swan, Hunter & Wigham Richardson, Ltd., have for some time past been developing two-stroke cycle Diesel engines, and the outcome of their research has resulted in the "Neptune-Diesel" engine, which, for marine purposes, is claimed to be second to none. The design is substantial in its strength, and another leading feature is great simplicity. The builders have also aimed at easy accessibility to all parts of the engine. Several radical improvements have also been introduced in the valve gear, pistons and cooling arrangements, all of which are distinctive features in this engine. The Neptune Engine Works, which have been established since 1879, have been frequently enlarged and improved, and the best of modern machines have from time to time been installed to replace older tools. Partly in order to develop the "Neptune-Diesel" engine more successfully, and also owing to the general expansion of business, Messrs. Swan, Hunter & Wigham Richardson, Ltd., have now embarked upon a complete re-organization of their engine works. This department is to be moved to another site within the Neptune shipyard, and entirely new shops are being erected. The present buildings of the engine works will be used for the shipyard, blacksmiths, plumbers and angle-smiths. For some months they have been busy clearing a plot of ground of about three acres in extent, with a splendid river frontage. The old Anglesey Copper Works of Messrs. Henry Hills & Sons, formerly stood on this spot. The whole of the department for building both engines and boilers will be at the north end of the Neptune shipyard, and will be adjacent to the dry docks department of the firm, giving further splendid facilities for executing repairs to ships and engines with rapidity and economy.

THE BRITISH ENGINEERS' ASSOCIATION.—The names of the gentlemen forming the Council of this Association have just been issued, together with the names of the honorary members.

THE "AQUITANIA."—It is expected that the Cunard boat *Aquitania* will be ready for launching in March, 1913, and that the fitting-out will require another ten months. Therefore an early date in 1914 should see this mammoth vessel ready for her trials.

BOARD OF TRADE EXAMINATIONS.

OCTOBER 24th, 1912.—LONDON: *1st Class:* J. De Jong, A. Macdonald, D. Mackenzie, J. Moffet, F. Scott, P. Thomas. *2nd Class:* W. Hulbert, J. Morrison, M. Nimmes.

LONDONDERRY.—*2nd Class:* J. Calvert.

BRISTOL.—*1st Class:* A. McNee.

GREENOCK.—*1st Class:* W. Fernie, S. Hutchison, J. Macdonald, T. Main, J. Wyllie. *2nd Class:* H. Anderson, J. Anderson, W. Farquhar, T. Ferguson, N. Gabbie, J. McConnell, R. McKendrick, A. Mackenzie, J. McLean, P. Main, A. Wilson.

HULL.—*1st Class:* A. Mason. *2nd Class:* F. Coggon, C. Lowery, C. Sales.

WEST HARTLEPOOL.—*Ex. 1st Class:* L. Swanwick.

LIVERPOOL.—*Ex. 1st Class:* S. Watson. *1st Class:* J. Murphy, C. Sharp, F. Yates. *2nd Class:* W. Beavan, M. Ferguson, H. Parsell.

NORTH SHIELDS.—*Ex. 1st Class:* D. Guthrie, W. Robertson, A. Tomkins. *1st Class:* J. Hall, S. Robinson, T. Tron. *2nd Class:* W. Fairhurst, H. Orr, T. Salmon, T. Young.

SUNDERLAND.—*Ex. 1st Class:* G. Barlow, J. Pritchard, *1st Class:* T. Knowles, J. Rossolimos. *2nd Class:* G. Charlton, J. Dove, W. Woollage.

ABERDEEN.—*1st Class:* G. Armit, J. Masson, J. Riley, J. Sinclair. *2nd Class:* W. Rennie.

OCTOBER 31st, 1912.—LONDON: *1st Class:* H. Sidle, H. Walter. *2nd Class:* J. Cumming, A. Davey, T. Jones.

SOUTHAMPTON.—*1st Class:* C. Edwards.

CARDIFF.—*1st Class:* W. Porteh, A. Smith. *2nd Class:* W. Evans, S. Stephens, C. Walton.

GLASGOW.—*1st Class:* J. Huntley, W. Mackay, D. McKenzie. *2nd Class:* J. Anderson, T. Burness, D. Ferguson, W. Lambie, F. Nicol, W. Nimmo, J. Stirling.

LIVERPOOL.—*1st Class:* H. Garn, C. Slack, J. Williams. *2nd Class:* R. Burnside, R. Cojeen, J. Jones, E. Midgley, S. Ramsay.

LEITH.—*1st Class:* R. Greig.

BELFAST.—*1st Class:* C. Doherty, J. Howard, L. Pollock. *2nd Class:* H. McAllister.

NORTH SHIELDS.—*1st Class:* W. Adamson, J. Hunter. *2nd Class:* A. Beveridge, J. Burns, J. Monkhouse, G. Potts, W. Ridley, J. Robertson.

NOVEMBER 7th, 1912.—LONDON.—*1st Class:* W. Bayley, C. Drewry, F. Greenall, P. Putnam. *2nd Class:* E. Latham, R. Liddle.

GLASGOW.—*1st Class:* A. Croll, R. McCheyne, E. Nicol, D. Took. *2nd Class:* J. Buchanan, J. Burns, M. Davidson, J. Elder, W. Glass.

NORTH SHIELDS.—*1st Class:* F. Gale, E. Radford. *2nd Class:* J. Charlesworth, T. Maughan.

LIVERPOOL.—*1st Class:* G. Brownlees, D. Gilbertson, F. Leonard, R. Lewis, C. Rowland, E. Service, H. Wood. *2nd Class:* G. Cookson, G. German, J. Gill, H. Parker, J. Steel, T. Thomas, J. Trousdale, J. Wakefield, W. Watson.

CORK.—*2nd Class:* J. Beatson.

NOVEMBER 14th, 1912.—LONDON.—*1st Class:* J. Mather. *2nd Class:* W. Curnow, R. Gahan, H. Langlois, T. Young.

NORTH SHIELDS.—*1st Class:* G. Curry, P. Ruddock, J. Smithson. *2nd Class:* C. Rosenburgh, J. Young.

GREENOCK.—*2nd Class:* J. Boyle, M. Bryson, W. Sinclair, W. Symon, F. Thorp.

LIVERPOOL.—*1st Class:* G. Dick, H. Jack, A. Kydd, T. Melville. *2nd Class:* H. Hooper, R. Newcombe, W. Reynolds, J. Shorttle.

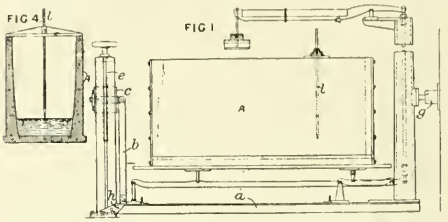
HULL.—*1st Class:* B. Parton. *2nd Class:* F. Clubley, C. Wood.

DUBLIN.—*2nd Class:* J. Barclay, W. Duncan, H. McKibbin, W. Saul.

The Marine Engineer and Naval Architect Patent Record.

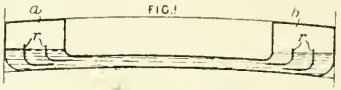
Compiled by Messrs. E. P. Alexander & Son, Chartered Patent Agents, 306, High Holborn, London, W.C.

15,832. Ships. Indicating Displacement.—The amount of cargo placed on board, and also the total displacement of a vessel, are ascertained by weighing a volume of water in a shell model of the exterior of the vessel between the two load lines, the volume of water being dependent upon the line of flotation. The mould A is placed on the platform of a weighing-machine, which is so supported that it may be accurately levelled fore and aft and athwartships. For this purpose, it is suspended by links *b* from a slide *c* adjustable by the screw *e*, the other end being mounted in a ball-and-socket joint *g* on the bulkhead. The rod *l* is set to correspond



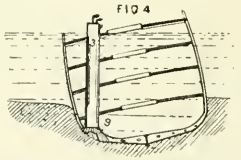
with the line of flotation, and the shell A is filled with water up to the lower end of the rod *l*. The locking-pieces *h* of the platform *a* are then removed and the weight of the whole is determined after levelling the platform *a*. Means are provided for making necessary corrections on account of the list of the vessel, comprising a plumb-line having a bob in contact with a table when the ship is on an even keel, and a wedge for insertion beneath the bob to determine the amount of list. The standard supporting the plumb-line is graduated in the same way as the rod *l*.

16,167. Ships. Ballasting.—Comprises improvements in the means described in Specification 13,783/08 for damping the rolling motion of ships. The side tanks *a*, *b*, more especially when of large dimensions transversely of the vessel, are provided with guide-plates *r* in order to divide



the water into a number of streams. By this arrangement, the formation of eddies is obviated and impact is reduced. The tanks *a*, *b* may also be of the forms described in Specifications 13,784/08 and 13,785/08.

16,594. Raising Sunken Ships; Caissons.—Stranded or sunken vessels are temporarily repaired by means of a tubular casing 3 open at the bottom supplied with air under pressure and, if desired, provided with an air lock. The lower end



of the casing is brought in proximity to the leak, and water dammed off by cement, fabric, etc., or by splaying the foot by means of plates 9 so as to allow access of workmen.

The Marine Engineer

And Naval Architect.

LONDON, JANUARY, 1913.

REVIEW OF THE YEAR.

ON the borderland of another year one can look back profitably on the past twelve months to note events and changes fraught with weal or woe to communities, or tending to the progressive advancement of the world as a whole towards higher ideals, nobler aspirations and more perfect manhood. Counting the losses of the year in shipping by means of statistics, month by month, these appear to have been less than during the previous twelve months, while fewer vessels have come under the category of "missing"—a term more heartbreaking than most of the other descriptive words under which are grouped the aggregate toll of the sea. The one great disaster which occurred in the month of April, when the *Titanic* collided with an iceberg and sank, was accentuated by circumstances which stirred up deep feeling all over the world, and brought forth many suggestions with a view to increased safety on the sea, more ample provision for rescue in the event of such being necessary, and enactments to bring about fewer disasters. An impetus was also given to the inventive faculty of many who turned their attention to special details in order to deal with weaknesses and faults revealed, or supposed to be revealed, by the loss of the Atlantic liner. There were other less desirable elements brought before the reading public amid the excitement provoked by the surrounding circumstances, tending to create strained relations where the most perfect harmony should reign. As far as can be gauged, the calm and sensible reasoning of later days has interposed to prevent what would prove to be retrograde steps. The improved conditions under which all seafarers follow their vocation have become on the whole general; there were some shipowners who lagged behind in carrying into effect what most of their contemporaries recognised as necessary, and many of them desirable, in view of all the conditions ruling both ashore and afloat.

The Exhibitions held during the year were interesting and valuable, both to the student and to those of more ripened experience. Those held in the Agricultural Hall, Islington, were on Smoke-Abatement and Non-Ferrous Metals respectively. The former conveyed many lessons on a subject which has occupied attention since the year 1223, when enactments were framed to prevent the use of coal, within the limits of certain residential neighbourhoods—on account of its noxious fumes, to the present day, when we have regulations compelling the adoption of improved methods for utilizing fuel economically and at the same time with the least possible emission of smoke. The papers read at this Exhibition have been published by the promoters, and help to shed some light on the means used to reduce the many tons of poisonous gases let loose on the atmosphere day by day. The non-ferrous metals enter so largely into engineering details that a study of the various components is of importance to all engineers, while the effects of corrosion and probable causes, and possible remedies, are details of great value.

The Exhibitions held at Olympia were a good help to progressive engineering, illustrating machine and tool makers' improvements to reduce time limits in engine building and yet preserve accuracy, motor vehicles, with accessories, oil for fuel and lubrication, while gas and oil engines of several designs for land and sea service were shown at work for the instruction and edification of visitors. Each Exhibition had something of a special character of its own worthy of study.

The papers read by Dr. Diesel and others during the year have increased the appreciation of shipbuilders and engineers towards the oil engine; at the same time the comments and discussions on the subject have added to the widening spread interest of shipowners. The acknowledgment made to Dr. Diesel at Berlin, for his painstaking and persistent study and experiments for nineteen years, until the first successful engine was developed, was a fitting and graceful act at the meeting of the German Shipbuilding Society. It was stated that the experimental work cost about £22,500, an expense borne chiefly by the engineering firms, the members of which had faith in the new motive power. Events justified their faith into conviction, and they are now reaping reward and recompense for their outlay by the influx of orders. Motor vessels for ocean service, coasting, canal and river traffic, as well as smaller craft for fishing, pilot and other services, have increased considerably, and there are indications that several steamship companies will in the coming year add the innovation of motor vessels to their steam fleet. Several ship and engine builders in different parts of the country have enlarged their works or have built new premises in order to undertake the building of oil engines, while they have also been devoting their attention to the study of the details, including the most suitable metals best adapted for this class of engine, improvement in design and the special tools necessary for dealing with the material to ensure accuracy and despatch.

The stream of emigration has continued to flow to the lands beyond the seas, and yet we seem to observe little or no change in the supply at the source, or even in the countries over which the flow has spread, due to the large area yet to be occupied. The medical examination undergone by the would-be emigrant ensures that those who are accepted are fairly healthy and strong, fit as a generation that will tend to maintain the continuity of kindredship in the oversea

dominions, and with it that bond of union which is alike desirable for the mother country and the offspring. In these circumstances we can view with more equanimity the trooping away of many whom it would otherwise seem desirable to retain.

The consideration given to the Royal Navy and its organization during recent months culminated in some important announcements both as to the contemplated improvement in the conditions of service for officers and men and the extension of the building programme. The offer of Canada to provide valuable additions to the Fleet has not only an intrinsic value but a further and far-reaching value, with the moral power attaching to it, showing the bond of union existing between the mother country and her children—a bond which, fostered on all sides, gives a guarantee to the world that racial sympathy has still in it all the elements which cause kinship to be maintained in spite of dividing lands and seas; the bond of such a union is a bond of strength to the Empire. The pronouncement, also, with regard to the land forces, recently made, has caused a quickening of the pulses of those eager to promote a stronger sense of that patriotic feeling which will induce young men to consider it a duty, alike to themselves and their country, to become efficient volunteers. The disciplinary training of the young men of a nation is in itself an excellent thing for many reasons, and such should be encouraged.

Shipbuilding and allied trades have been floating in flood tide, and high-water mark does not appear to have been reached yet, as orders are still being booked, while several are in contemplation, due to extensions of shipping companies and new routes being opened up in different parts of the world. The oil engine promises to be a great feature in the coming year, judging from the number of firms which have made arrangements to build these, and the orders already booked. The returns received from the various shipbuilding centres show the large volume of trade which has been flowing over the country. Prosperity has crowned the year, in spite of the unhappy strife by reason of the divisions created and encouraged between different classes of the community, for want of that master faculty which recognises with wise and discriminating judgment the course of speech and policy mete for the occasion as well as for the circumstances, not only of those under review, but of all classes of the community. There is no argument in invective, and there lurks beneath it the suspicion that he who uses it has no discrimination, besides being lacking in that sense of fairness which makes for a pacific solution of difficulty, even when the love of money, the root of most of the evil, is the foundation of it. The increased wages paid to all classes of seafarers has been one of the features of the past year, and it is pleasing to note that in many cases the improved conditions were spontaneously brought about, showing a desire on the part of employers to give a share of their growing prosperity to those who helped in some sense to maintain the growth.

To all our readers, wherever situated, in the north, south, east or west, we send friendly greeting, and as we commit our thoughts to visible language there pass in review before our mind's eye the forms of a large number of our subscribers with whom we have held sweet counsel in the past, and hope to do so again in days to come. Our thanks are due and are yielded with pleasure to our friends and supporters; whether sailing on the seas in touch with their homeland, or on the oceans washing further shores, whether located in their own land or in that of the stranger, our good wishes to you all.

STAFF OFFICERS IN INDUSTRIAL WORKS.

ENGINEERING is such a potent factor in the progress of affairs all over the world that it behoves everyone who looks at industrial developement with the proper sense of perspective to recognise to what an extent the human factor is brought into play in successful and beneficial commercial operations, and it is from this point of view that Sir A. Trevor Dawson, R.N., M.I.C.E. has taken up the subject of staff officers in industrial works, their scientific and industrial training and duties, as the subject of his presidential address delivered to the Junior Institution of Engineers. We think that the subject matter of this address is well worthy of the earnest consideration, not only of our young men, but of those in positions of high responsibility whose duty it is to select candidates for and fill up the vacancies in large industrial concerns. The President properly points out that the demand now is for well-trained young men having experience of materials, mechanical methods and men, and that the three forms of experience differ very widely. Again it is pointed out that not only do the personal characteristics requisite for acquiring and assimilating the experience differ, but that the sources of these types of experience also differ, as well as the fields in which each type of experience is to be applied. It may be said as a general rule that it is not possible for one person to attain efficiency in the highest degree in all the three forms of experience, as there are relatively few appointments in the industrial world where the three are necessary in a superlative degree. It follows therefore that it may be desirable to have an intimate knowledge of one subject and an intelligent general acquaintance with another. The direction in which specialization must be made should be determined by the personal characteristics of the student and the goal which he desires to reach; but whatever that latter may be it cannot be too strongly impressed that experience is really the dominant factor and that the ambition of advancement in a monetary sense may be in the long run the factor which prevents the

acquirement of wide experience and thus reduces the ultimate value of the individual owing to limited experience.

One recognises that one of the strongest characteristics of youth is impatience, indicated in the desire to advance rapidly to high salaried posts, and such a trait must not be wholly smothered, as the striving for personal advancement may in its cumulative form tend to advancement in engineering practice. If a youth stops in any department until he is thoroughly proficient, so that he is able to earn his wage plus the necessary profit to industry, there is a great temptation for him to remain too long on the job, and although his pecuniary gain is greater, his opportunity of experience is limited and although going to another department may mean less money, his wisdom will be shown by his accepting experience as part of his remuneration, when he can afford to do so.

Considerable facilities are now afforded by many employers of labour and owners of works under which an apprenticeship in the factory can be sandwiched with some measure of theoretical training, and the standard of efficiency of workmanship is improved by the attendance at science classes in the evening and increased wages being paid according to the standard attained in the work in the science classes. In this way the intelligent and industrious youth can advance to a stage beyond the ranks of the ordinary workman and every help and encouragement should be given to apprentices who show proficiency. In this direction it is recognised that there is a national need for much more highly-trained engineers, *i.e.*, of men who combine scientific with practical knowledge and have had experience of materials, mechanical methods, and men to serve on the staff of works.

After dealing with the subject in considerable detail under the various heads, and having shown the great national need which exists, the president does not think it is too much to expect that the State should extend its educational system, so as to enable the best of our youths to enter upon a combined practical and theoretical training for the largest of our manufacturing industries, without requiring great sacrifices on the part of the parents, who may be unable to support their sons throughout the prolonged period of training. He points out that such a general educational scheme need not be confined to engineering, and that the example of foreign governments might be usefully followed with reference to the provision of means for the constant supply of staff officers for factories and by encouraging talent in such a way as to continue the numbers of pioneers in inventive work.

He points out also that the duty of fostering mechanical science is one which will yield the highest reward to the nation and should commend itself, apart altogether from its social considerations. It is well that we live in an age in which mechanical science is pre-eminent, affecting as it does the national activities in every direction, while our national prosperity and national security are dependent on our supremacy in engineering in every department of practice. The president brings home very forcibly to our minds the national need there is for high grade intellect to create new appliances, to improve old apparatus in manufacture, to perfect design alike with regard to its applicability to work, to durability and to economy in operation, so that we may as a nation hold a prominent position among other nations of the world as competitive traders.

"TITANIC" ENGINEERING STAFF MEMORIAL.

WE have received from the Honorary Secretaries of the Committees reports as to the growth of the *Titanic* Engineers Fund.

Institute of Marine Engineers, London, up to 23rd November	£2566 0 0
Southampton Committee (for the erection of a monument in Southampton) up to 20th December	£1648 16 3
Liverpool Committee (for the erection of a monument in Liverpool) up to 20th November	£4968 12 9
Total	£9183 9 0

THE LIGHTHOUSE LITERATURE MISSION.

THE beneficent work carried on by this mission is deserving of the sympathetic support of all who have an interest on the sea, whether in the owning of ships, in commercial ventures, or in those whose lives are spent on the ocean wave, and whose course is closely watched as they pass from port to port in course of their voyaging to and fro. The watchers at home depend for their information on the ceaseless vigils of those on whose behalf the mission was founded and is carried on. Located far removed from the amenities of social life, the lightkeepers in their solitary beacons have claims upon all communities—for all are more or less interested in the safety of the sea to those who do business on the great waters of the deep. The funds of the mission are, according to the hon. treasurer's balance sheet, not only depleted, but the hon. director, Mr. S. H. Strain, has met a deficiency by an advance of nearly £500 to keep the work going. It is realized that the time and labour of Mr. Strain has been given so freely and fully that the financial burden should be borne, or at least more largely, by others, and an effort is being made to help him also to further the object of his mission, and this is to obtain and forward magazines, papers and books to the lightkeepers around the coast-land, including the lightships. The mission has for sale pictures and post-cards of lighthouses; these are sold for the benefit of the funds. Subscriptions and donations, great or small, will be welcome.

THE Exhibitions to be held at Ghent and Amsterdam in the course of the year should be noted by all who are interested in motor machinery for land or sea service, as the preparations which are being made for these bid fair to make each of them worthy of the attention of visitors to whom the subjects appeal.

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(From our Own Correspondent.)

The Royal George.

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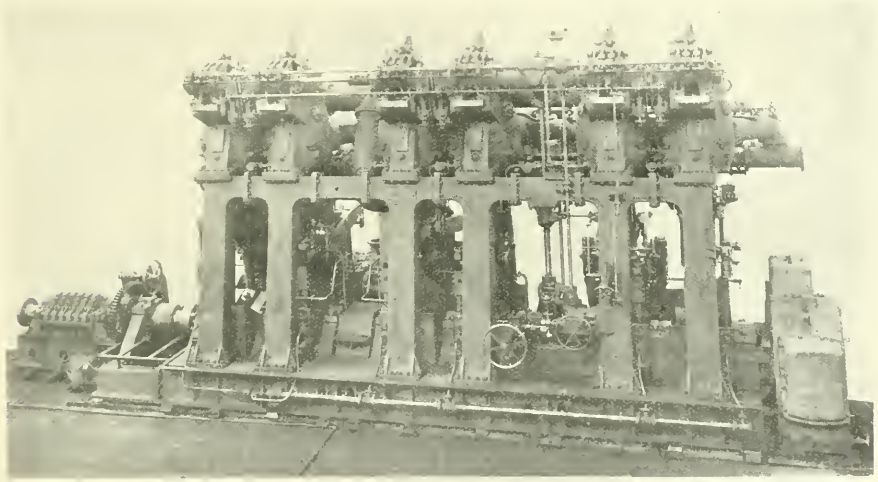

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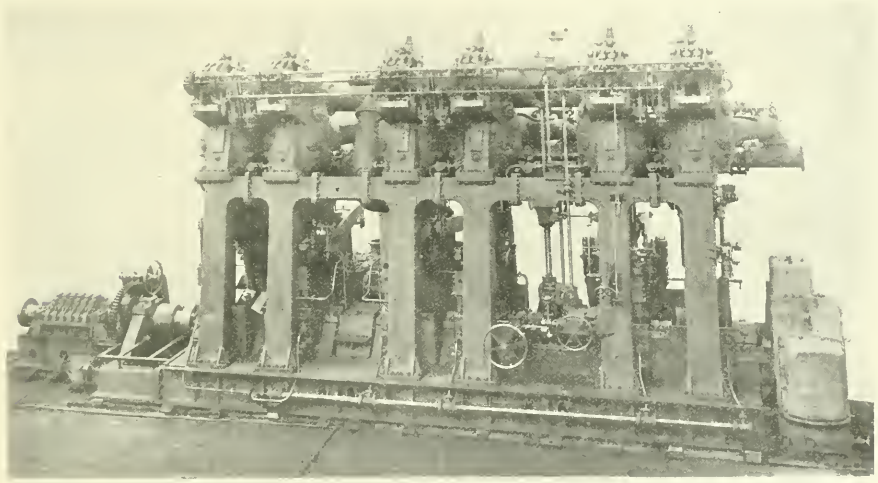

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The Story of the P. & O. Line.

THOUGH the great steamship company of Leadenhall Street did not receive its first charter from the Crown till the year 1840, it has every claim to the title of the oldest British ocean steamship company. The General Steam Navigation Company, indeed, dates from the 'twenties, and was originally intended to be what its name indicates, a company trading to all parts of the world, but it has for many years confined its activities to home waters, the North Sea, the Channel and the Bay of Biscay. The P. & O. Company sprang into existence from an older Peninsular line which had the more modest object of taking mails and passengers from London (*via* Falmouth) to certain ports on the Iberian Peninsula, making its further terminus Gibraltar. Now the origin of the Peninsular service dates from the year 1834, the agents for the line being the firm of Willcox & Anderson, of London, who had for some years previously been engaged with sailing ships in this particular trade, and who had behind them the Messrs. Bourne, who were the largest shareholders in the City of Dublin Steam Packet Company. Various vessels belonging to different companies were employed in making the early sailings. Amongst them are found the names of one from the General Steam Navigation Company's fleet, three belonging to the City of Dublin Company, and one to the St. George's Steam Packet Company. The *William Fawcett*, as far as it has been possible to ascertain, was the first steamship to make a sailing for the new Peninsular Company, though the honour has indeed been claimed for the *Royal Tar*. That the *Royal Tar* was the first of the pair to cross the Bay of Biscay appears to be undeniable, but it would also appear that her earlier voyages were undertaken, not for the Company, but for the Spanish Government. But the point loses some of its importance when we remember that both the vessels were taken over from the City of Dublin Steam Packet Company. The *Royal Tar* was a wooden paddle steamer of 650 tons and 263 horse-power, and, apparently, a much larger vessel than the *William Fawcett*, which, from the table issued by the P. & O. Company, seems to have been a very small vessel indeed.

It was in 1836 that there came out the *Iberia*, first of the steamers specially built for the service. She was of 516 tons, and came from the yard of Messrs. Curling & Young, at Limehouse. The *Braganza*, also built on the Thames, quickly followed, and so did the *Tagus*, which opened the long-standing connection of the Company with the Port of Greenock as a shipbuilding centre. The first mail contract dated from August, 1837, and the first sailing was made during the following month. There were at first three despatches a month from London, the final departure being made from Falmouth, and the steamers calling at Vigo, Oporto, Lisbon and Cadiz, on their way to Gibraltar. This service was soon made a weekly one. The month of September, 1840, was an important one for the P. & O. Company, as it saw the first of the despatches under their new contract for the carriage of the mails between England and Alexandria. For this service two much larger steamers were provided. They were the *Great Liverpool* and the *Oriental*, vessels of from 1,500 to 1,600 tons, originally designed for the work of the North Atlantic trade. Then came the institution of a branch service from Malta—one of the ports of call of the Alexandria liners—to Corfu, then a British possession and a station of some importance in the Mediterranean.

It was in 1840 that the Company assumed its full title under the authority of its first Royal Charter,

The P. & O. S S *Bentinck* (1974 tons, 520 h.p.) entering Aden, 1843.

"HIMALAYA." "ROYAL GEORGE," 120 Guns.

The *Himalaya* Steamship in Plymouth Sound with Troops for the Crimea, 1854.

and two years later it undertook the responsibility of providing a mail service to Calcutta. This the Hon. East India Company granted it with some reluctance, and, indeed, in the then state of the arts of steam navigation and shipbuilding, the undertaking of a regular service of that kind was one of considerable daring. The vessels which were to be used on this line had, of course, to go out to their station round the Cape of Good Hope, and for large engine-room repairs they had to be sent back to England. A big breakdown meant, of course, the sending home the news by mail—for there was no idea of a cable—and the sending out of a reserve ship by the long sea route. The organization to maintain such a service entailed the provision of stores, coaling-stations, docks and even, in the case of such ports as Aden and Suez, water reservoirs. Coal was supplied to some of the Eastern stations by sailing vessel, but to Suez it was sent from Alexandria through the Mahmoudieh Canal to the Nile, and so to Cairo, and thence carried by camels to Suez, a hundred miles off, across the desert. Such cargo as could afford the rates was dealt with in similar fashion, whilst the passengers were carried in omnibuses. From the East there was, as Sir Thomas Sutherland is wont to remind the shareholders in some of his luminous speeches, a good supply of cargo that could afford the highest rates, for the East yielded in those days indigo, tea and silk, as well as the precious metals.

The *Hindostan*, a vessel of just over 2,000 tons, was the first sent out by the Company to maintain the Suez and Calcutta service. This was in September, 1842, the month in which the contract was obtained, and she was quickly followed by others, until, in the year 1844, the Company felt itself strong enough to accept a further contract to carry the mails from Galle—where the new branch connected with the Calcutta and Suez steamers—to Singapore, Penang

The S.S. *Colombo* arriving off Sebastopol 24th Dec., 1854, with provisions for the British Troops.

The Overland Route to India.—P. & O. passengers crossing the Isthmus of Suez (1858).

and Hong Kong. For these services the country had, of course, to pay what by modern standards seem to be high compensations. The Gibraltar service at first cost £23,000 per annum, but this amount was subsequently reduced to £20,500. The Alexandria line was subsidised to the extent of £34,200. The Malta and Corfu branch cost the country £10,712 a year, that between Suez and Calcutta £115,000, and the Hong Kong extension £45,000. But when the small earning capacity of those early vessels, with the amount of their coal and stores bills, comes to be considered, the assistance is not by any means excessive, for at that time unsubsidised steamers, at all events east of Suez, were a commercial impracticability. Moreover, there was an economy to the public through the employment of the P. & O. Company, for its steamers cost, on the most expensive route—that between Suez and Calcutta—but 20s. a mile, whilst the Hon. East India Company, which retained the Bombay and Suez service in its own hands, found that an inferior, slower and less commodious fleet cost it fully fifty per cent. more to work than the P. & O. charged. It was not till 1854 that the public was able to force the authorities to hand over the Bombay mails to the P. & O. people, and this was only done in consequence of the public outcry at the loss of an outward mail in a native sailing vessel, in which an attempt had been made to forward it in the absence of a Government steamer to take it forward. Even when the East India Company's steamers made their sailings to time their trips were somewhat lengthy, an eighteen-day passage from Bombay to Suez being by no means unprecedentedly long. In the year 1843 there was added to the fleet the *Pacha*, a vessel which at first was employed in the Peninsular line. She was remarkable from the fact that, being of iron, she in those early days had the opportunity of demonstrating what seems in some cases to-day to be

The arrival of the P. & O. Co.'s *Ripon* (1908 tons, 450 h.p., J. M. Rogers, Commander) in Southampton Docks, with General Garibaldi and suite on board, on his visit to England, April 3rd, 1864.

The King's Storm Cabin on the *Medina*. (Royal Visit to India.)

the time of her building the largest vessel ever constructed.

She was launched from the yard of the Thames Ironworks at Blackwall and was really far in advance of the requirements of the times. But she did magnificent service for the country, with other vessels of the fleet, in taking troops to the Crimea and was so much appreciated in that work that she was permanently taken over by the country. This work of trooping has ever been one in which the P. & O. has distinguished itself. Had it not been for its ships and the efficient organization of the line, things might have been different in the issue of the struggle with the Indian mutineers. P. & O. steamers were transports in the China war and indeed have been employed on every occasion on which we have had to send troops over sea. The *Carthage* of 1881—whose sister, the *Rome*, became well known in her later days as the steam yacht *Vectis*—was fitted out as one of the most efficient hospital ships ever sent to sea. And besides all this the Indian trooping business has now for many years been conducted with the utmost satisfaction by hired liners, of which the P. & O. always provides its share.

It has been stated that when the Company adopted screw propulsion the managers discarded the paddle save for special services. When the railway was completed across France it became possible to save the crossing of the Bay of Biscay, with its attendant delays and possible bad weather, by travelling overland to Marseilles, and fast steamers were provided to connect with the main line steamers at Malta. These branch steamers were paddlers of high speed and amongst them are one or two famous names, such as the *Delta* and the *Massilia*. At a later date, when Brindisi had been adopted as the port to which the cross-Europe mails were sent, two fast twin-screw steamers of comparatively small tonnage—say 2,000 tons each—were provided in the *Isis* and the *Osiris*, which crossing to Port Said, pick up the mail which left London on the Friday night, on its arrival at Brindisi on the Sunday evening. The sea passage takes another forty-eight hours or so, and thus the mails overtake the great steamship which left London a week before they did. There is, of course, a weekly mail to Bombay. But the direct steamer to that port only sails fortnightly, the intermediate mails being taken by the fortnightly Australian liner. On these weeks the mail is transhipped at Aden to the *Salsette*, a fine and fast twin-screw vessel of a much magnified "Isis" type.

The P. & O. Company has not as yet become much impressed with the desirability of the amalgamation schemes which have involved so many other famous Companies. It has, however, taken the opportunity of absorbing the Lund line of passenger steamers from London to Australia *via* the Cape of Good Hope, and already it has added several important steamers to that branch. These include the *Ballarat*, *Beltana* and *Benalla*, whilst for the same service there are also under construction the *Berrima* and the *Borda*. These are all twin-screw vessels of upwards of 11,000 tons gross register. At the Company's annual meeting in December, 1912, the chairman explained that at the present moment the Company has 95,000 tons of shipping under construction. This total includes the "B's" just mentioned; the vessels of the new "K" class and the *Kaiser-I-Hind*, an improved *Medina*, which takes her name as a memento of the King-Emperor's recent visit to India.

Besides duplicating the machinery of all their recent ships the P. & O. has of late fitted its passenger steamers with wireless apparatus so that they may be able to make use of the stations which are now being erected in the

The Queen's Dressing Room with Swinging Cot on the *Medina*.

important places in the Far East and South. Of the value and importance of such installations we are reminded in almost every week by the shipping papers. One of the "M" class of steamers is now generally detached by the Company for the public yachting business, and affords at the various seasons of the year opportunities for visiting the Norwegian fiords, the Western Islands and the various points of interest in the Mediterranean Sea. At the present moment the Company is calling the attention of the tourist to the attractions of Ceylon as a winter resort, and, above all things, as a place for the motorist! So small and so civilized has the world become, thanks in so great measure to those who, like the P. & O. Company, have for the best part of a century tried to minimise ocean distances! The main fleet of the Company now comprises 71 vessels of 543,961 tons, built and building. Of these, 84,840 tons are comprised in the branch fleet which does the work of the old Lund line. In addition to these vessels and not included in the totals given, there is a large total of tenders, barges, tugs and auxiliary vessels generally, whose numbers are considerable, though their individual size is small.

One point has not been made in reference to the Company's development, but it is one that should not be forgotten. It is that much as the ships of the line have done for the state as troopers and as mail ships, that by no means ends their public services, for officers of all kinds, both civil and military, have maintained a steady flow outwards and homewards between the Mother Country and her distant dependencies, the Company giving them facilities for their transit. Officials booking by P. & O. have no need to be anxious about their arrival, for the Government departments recognise the punctuality of the vessels and any delay that befalls them is reckoned as what the lawyers call a *vis major*—an untoward happening for which the individual cannot properly be blamed.

NAVAL MATTERS—PAST AND PROSPECTIVE.

(From our Own Correspondent.)

Portsmouth Dockyard.

ALTHOUGH day and night work is being carried out in the yard to a large extent, we are not without expectation of further orders shortly, both in the way of new construction and refits. While it is not anticipated that Mr. Churchill's remark about building another heavy ship in the public establishments refers to the preparation of a second slip at Portsmouth, the vessel now in hand may be launched in March next, and if thought expedient she could be followed by another to be put into the water in the autumn. In that case, no less than three, and perhaps even four, new vessels could be in hand in various stages in the yard at the same time. At present, owing to the unusual haste with which the *King George V.* was commissioned, the *Iron Duke* is the only vessel completing, and the *Albemarle's* refit being finished, the yard is ready for another vessel. The last-named ship, after satisfactory trials, was commissioned with the crew of the *Exmouth* on December 17th, and will rejoin the Fourth Squadron. The *Exmouth* is not to refit here; she is to go to Malta for the purpose, and while there will have a reduced nucleus crew. The *Neptune*, which followed the *Monarch* into the floating dock in order to have her under-water fittings examined and her hull painted with anti-fouling composition, has been supplied with broader bilge-keels, since experience with other vessels of the "Dreadnought" class which have been so fitted has given very satisfactory results. More vessels of this class will come here probably to be treated in the same way. During the *Neptune's* refit some armoured casings have been fitted to the secondary battery of 4-in. guns. According to report, the work on this ship has been executed most expeditiously, and this is in part due to the ease with which communication is maintained between the yard and the dock by means of a flying bridge which facilitates the transport of material to and fro. The committee, with Captain Grant-Dalton as president, which is to enquire into the pay, prospects and conditions of service of the crews of the yards' craft is expected to visit all the establishments in turn. There seems to be an idea that billets for pensioners and retired seamen may be found in this service. The *Duke of Edinburgh* left for Gibraltar on December 6th, and the *Good Hope*, having been relieved in the Mediterranean by the *Inflexible*, arrived from thence on December 8th. In place of the *Duke of Edinburgh* there are the commissioned ships *Invincible*, *Achilles* and *Cochrane* in hand for refit, and day and night shifts are working on these vessels. The authorities are very pleased with the output of the *King George V.*, this ship having been completed in two months under two years from the date of laying down, a record which compares most favourably with those of many of the contract-built vessels. There is no sign at present of more guns for the three scouts in the basin, but the *Victoria and Albert* employs a fair number of hands on her usual winter overhaul, and there are several small craft undergoing minor repairs. The *Southampton*, cruiser, was commissioned with a nucleus crew on November 26th, and was the first of her class to be completed, although the *Chatham* has since hoisted the pennant at Chatham Dockyard, and the *Dublin* is expected before long at Devonport. For the present, the *Southampton* remains under the orders of the Commander-in-Chief here. The fleets to which these three new cruisers will be allotted are not yet definitely known.

Devonport Dockyard.

The difficulties which are being felt in the public establishments in obtaining the services of a sufficient number of skilled shipwrights and engine fitters has a direct bearing upon the subject mooted by the First Lord of putting another big ship in hand here. It is taken for granted that Devonport was the yard to which he particularly referred when he said he had thoughts of laying down another battleship in a Government establishment. But it will certainly be far from easy in the present state of the skilled labour market to obtain the men for the purpose, since not only can they earn higher wages in the employ of the private firms, but the outlook in the shipbuilding trade is such that practised hands can have no fear of being idle. It is understood, however, that men now taken on are to be guaranteed employment up to March, 1914, and this may be an inducement for some to come into Government employ; even so, since the number of really qualified workmen of the kind required is limited, it must be a case of the Admiralty competing with their own contractors. There is indeed no lack of work either in the construction or refitting departments, and overtime is the rule all round. It is an ill wind that blows no good to anyone, and although the sad accident which occurred on December 9th is in every way to be deplored, it has caused the return of the *Centurion*, and thus adds another to the ships in hand. She had made several highly satisfactory steam trials before the collision occurred, but now she will be delayed for about three months for repair. The starboard bow and stem of the vessel have been damaged, and in addition there are several plates dented, as well as some of the outside fittings, like net shelves and defence booms. Here at the end of the year there are three vessels on the slips. The *Warspite*, laid down on October 31st, is making good progress, and if no delay occurs in the supply of building material she should be ready to go into the water in time to begin another battleship before half the year is out. The light armoured cruiser, for which a name has yet to be chosen, is also progressing most satisfactorily, the greater portion of her framework being in place. One of the oil tank vessels to be built here has been begun, but it appears to be uncertain at present whether the other will be laid down until this one is put afloat.

The *Marlborough* is the only vessel built in the yard which is now completing, but the practice obtains more and more of sending contract-built ships to the yard to be prepared for trials and finished off. The *Conqueror*, which arrived on November 22nd, has been commissioned with a nucleus crew. Some of the dockyard hands have been transferred to this ship in order to complete work upon her to avoid delay, the cost of such work being charged to the contractors. The *Dublin* has been ordered to complete at Dalmuir, and the navigating party which was sent to join her at the end of November has therefore returned here. The *New Zealand*, from Govan, after completing her trials, was commissioned with a full crew for service in the First Cruiser Squadron on November 23rd. The electrical work in this ship not having been completed when she left the Fairfield yard, the contractors have finished it here. The *Princess Royal*, having made satisfactory acceptance trials, left to join her squadron and has since gone to Portsmouth to give leave. She has taken the place of the *Inflexible* in the First Cruiser Squadron. Among other vessels in hand has been the *Bellerophon*, which has had her fire-control platform widened in order to give additional space for range-finders, etc. She has also been fitted with broader bilge-keels in order to give her increased steadiness in a sea-way. It is now understood that the *Carnarvon* will be the new flagship at the Cape in place of the *Hermes*, and that this is the reason for fitting the vessel with a stern walk. It is also said that the *Pandora* is to return from this station without waiting for her relief.

Chatham Dockyard.

The past year has been the busiest one we have had for a long time, and the last month found us with plenty of work in hand, while overtime has been the rule and not the exception. On the slips, the *Lowestoft*, cruiser, is making rapid progress, and should be ready for launching early in the New Year. The light armoured cruiser yet unnamed also shows the result of pushing on her construction, and her framework has been rapidly put together. Other building work includes the Submarines, now a standing feature of this yard, while we also have the *Stork* being converted into a training ship. As reported from the other yards, there appears to be a large demand for additional skilled labour of several kinds, and special inducements are being held out to well-qualified men. A better plan would be, it is said, to increase the establishment of the yard, and thereby give to the men that certainty of employment which makes up for lower wages. A second submarine, *E*2, was put afloat on November 23rd, and has been taken into dock. Mrs. Erskine, the wife of the Commodore of the Royal Naval Barracks, performed the naming ceremony. These *E* boats have a length of 176 ft., a beam of 23 ft., and a surface displacement of 700 tons. With 750 shaft horse-power, they are expected to have a speed of 16 knots on the surface, while under the water motors of 600 horse-power give them ten knots. They carry four of the largest torpedo tubes and were built to be equipped with two 3-in. quick-firers, but according to the latest accounts the fittings for guns in all the submarines are likely to be removed. The two sister boats, *E*7 and *E*8, are in a forward state, and it is anticipated that all four will be ready for service by the end of March. The next boats we are to have will be heavier, faster and more powerful. The *Chatham*, cruiser, did not complete her trials, but her machinery was accepted and she commissioned on December 3rd. She has thus been made ready a month earlier than was expected. Part of her crew was supplied from the *Formidable*, which will be in hand for some little time. It is stated that for the present the *Chatham* will remain at this port. The *Vanguard*, after having had her under-water fittings and hull examined in the floating dock in the Medway, has come on here for an overhaul of her machinery, etc. It is anticipated that she will be in the basin for another fortnight. The refit of this vessel and that of the *Agamemnon* are not to take longer than a month, and overtime has been used to expedite matters. The *Vengeance* will pay off and re-commission for service in the Sixth Battle Squadron, and as gunnery training ship at the Nore in place of the *Jupiter*, on January 8th. The crew of the *Jupiter* is to turn over to her, and that vessel will go into the Eighth Battle Squadron. It is understood that all the ships of the *Vengeance* class will go into the Sixth Battle Squadron. Other vessels in hand here are the *Andromache*, *Topaze*, and *Hogue*, while the *Blanche* left on December 4th to rejoin her flotilla. As usual, several destroyers are in hand undergoing repair. These vessels are constantly changing, and as soon as those dealt with resume duty others take their place. There are upwards of 10,000 men in pay at this yard. In future, all battleships and first-class cruisers are to carry an Admiralty pilot when passing up and down the Medway, and other vessels are to take a pilot unless the officers of the ship are prepared to carry her into the locks.

Sheerness Dockyard.

This yard has been fairly busy during the past year, and its quota of work has been rather above than below the normal rate. What with repairs to torpedo gunboats and destroyers, and the periodical docking which these small craft require, there has been no long period when business has been slack. The only thing we could wish for is a small proportion of new construction, for the yards on the Medway hardly get a fair share of this work. In another way the port, if not the yard, profits, for we are seldom without a number of vessels either in the harbour or at the Nore, and the new floating dock brings additional work. It has recently been in use again for the *Vanguard*, and it is not too much to say that its extreme usefulness and value have already been demonstrated most fully. Another question has been settled by the manner in which this bulky structure rode out the equinoctial gales of the late autumn. It is not yet certain how the establishment of a Sixth Battle Squadron will affect matters here, since up to the present it has only meant another change in the gunnery ship at the port. The *Endymion*, cruiser, was only relieved by the *Jupiter*, battleship, a few months back, and now the *Jupiter* in her turn is to be relieved by the *Vengeance* on her change from the Third to the Second Fleet. The *Antrim* was supplied with a full crew on December 3rd, and with a new captain passed from the Fifth to the Third Cruiser Squadron, in which she becomes the flagship of Rear-Admiral C. E. Madden. Captain E. C. Villiers succeeds Captain C. D. Johnson as captain of the *Actæon*, the parent ship of the Naval Wing of the Royal Flying Corps, but it is rumoured that when the Eastchurch School is in full going it is to have its own tender, on the books of which vessel the officers now borne in the *Actæon*, as well as those at the Upavon establishment, who are now on the books of the *President*, are to be borne. The works at Eastchurch are growing apace, and early in the New Year the sheds and other buildings should be completed. The lamentable deaths of Lieutenant Wilfred Parke, R.N., of the Flying School, and of Mr. Hardwicke, who was a frequent visitor here, are deeply deplored, both at Sheerness and Chatham, and much sympathy has been expressed for their friends and relatives. Lieutenant Parke was most popular with all who knew him. He was a daring aviator, but his feats were the result of much experience and knowledge, and his loss to the Flying Corps is a serious one. The publication of the names of the officers of the Corps in the official Navy List is regarded as a proper recognition of the position and responsibility of this new branch of the Service. The destroyers of the 1911-12 programme, the construction of which was pushed forward to meet a similar acceleration in Germany, are beginning to arrive. The *Christopher*, from Messrs. Hawthorn, Leslie & Co., came in at the end of November, and has been commissioned: with the *Shark* and the *Acasta* she takes her place in the Fourth Flotilla. Mr. E. Beaton's return to the Admiralty staff after eight years' service at this yard, while a matter for congratulation to this hard-working official, is much regretted by all who have come into contact with him. He is succeeded here as Chief Constructor by Mr W. T. Hockaday, from Chatham.

Pembroke Dockyard.

While it can be said that the prospects of this yard look considerably brighter than they have at the close of many previous years, there still seems to be a good deal of uncertainty about the future. We have expected one of the new light armoured cruisers, and about the beginning of October we were told this was a sure thing, but all the eight vessels in this year's programme have now been allotted elsewhere. Devonport and Chatham have one each, and the other six are to be built by contract. Then again, we were to have had an oil tank vessel, but she has not yet been begun, nor the barge which was to be built here. Possibly the delay is due to non-supply of material, and rests with the contractors. The *Nottingham*, begun here in June last, is making fairly satisfactory progress, but there must be a good

trial of acceleration if she is to be launched within the financial year. Here again there appears to have been some difficulty in connection with the delivery of material. The *Amphion* will be ready to begin her full speed trials early in January, and it is hoped that she may be in commission within two years from the date of laying down. This is not, however, anything like as short a period as should be required for the turnout of a cruiser of this class. The *Fearless*, which was laid down in the autumn of the same year as the *Amphion* and launched in June last is getting on somewhat faster, but it is unlikely that she will be a record ship. The destroyer *Ouse*, after a complete refit, has made her full power trials satisfactorily, and in the first week of December left to join the Fifth Flotilla, where she takes the place of the *Ness*, which with the *Nith* are the two destroyers we have at present under refit. When they have had their boilers retubed it may be expected that they will be succeeded by others of a similar class in need of attention. We still live in hopes of seeing the squadron which Mr. Churchill some time since spoke of being based on this port in view of its strategical advantages.

THE DUKE OF CONNAUGHT DOCK.

DETAILED accounts have come to hand regarding the experiences of the great Barrow-built dock during her voyage across the Atlantic. These seem to have been exhausting and exciting enough. The structure is some 600 ft. long by no less than 135 ft. wide, and is therefore sufficiently unwieldy to tow. Nevertheless it left Barrow on the last day of August in tow of two large Dutch tugs—the *Zwarte Zee* and *Roode Zee*, which had been specially fitted with large oil-tanks forward and distributing apparatus to enable them as far as possible to prevent the breaking of heavy head seas upon the flotilla. These tugs were those which had in company taken out a floating dock to Rio de Janeiro in the summer of 1910, whilst the *Roode Zee* had helped in 1908 to tow out the Callao dock, following up that performance the next year by towing a large grain elevator across the North Atlantic. The *Duke of Connaught*, as the Montreal dock has been suitably enough called, was insured for a quarter of a million sterling, and the premium originally charged to cover both building and towage risks was five guineas, though, when the departure was postponed so late in the year, the rate for re-insurances ran as high as twelve guineas, some underwriters having had bitter experience of the Atlantic during the earlier months, and having the recent loss of the Lagos dock before their eyes. Every precaution seems to have been taken to minimize the risks of the voyage. Wireless was installed on the dock and a considerable quantity of coal was loaded on it so that there should be a supply available for replenishing the bunkers of the attendant tugs should they run short of fuel when out at sea. When the Azores were reached the tugs took it in turn to go into Fayal, so that one of them stood by the tow all the time, whilst the other was coaling. On the 21st September the second, and, as it proved, the more arduous part of the voyage was commenced. The day after leaving the weather became so bad that the wireless installation was injured. Then on the evening of the eighth day out the cables of both tugs parted in quick succession and the dock drifted away rapidly to the south and east, making a distance of nearly sixty miles before she was made properly fast again, some forty-eight hours later. A second break away was reported as having occurred on the 8th October. But the third and most dangerous experience of the kind took place on the morning of the 13th October, when the flotilla was forty miles north-east of Sydney, Cape Breton. The dock then got adrift in a northerly hurricane and was driven rapidly towards the rock-bound coast of Nova Scotia. There was no chance therefore to wait—as on the previous occasions—till the weather somewhat moderated, before making the attempt to connect the cables again. But the weather was so severe, and the dock presented so great a wall-surface to the wind, that even the full power of the tugs was unable to draw the tow in the teeth of the storm, and the whole trio was forced slowly and fighting every inch to leeward. Fortunately, when within five miles of the coast, the wind changed and they were able to make a good offing and so get to Sydney, Cape Breton. Thence they proceeded on the 22nd October, the news that the third stage of the journey had been entered upon, cheering the hearts of the underwriters to the extent of making them satisfied to take a rate of five guineas again for the St. Lawrence risk. With a view to steady the dock and make it more manageable in these comparatively narrow channels, some of the after compartments were filled up with water. Here again bad weather was encountered and a good deal of anxiety felt by those who were responsible for the navigation. But on the 1st November, after a voyage of just two months, Montreal was safely reached. On the 18th November the formal opening of the dry dock was performed by H.R.H. the Duke of Connaught, who paid a well-deserved tribute to the pluck of the runners who composed the crew of the structure during its voyage.

MARINE MOTOR NOTES.

THE closing month of the year has seen several new orders placed for oil motors both for ocean cargo-carriers and smaller coasting vessels. The most important of the former are for the Atlantic Transport Line—forecasted in previous notes—and the East Asiatic Co. It is also contemplated on the part of the latter Company—if not actually resolved upon—to remove steam driven engines from two of their ships and fit internal combustion engines in their places; this is taking the bull by the horns without doubt, and is evidence of the success which has attended the new vessels built and fitted with oil engines for this company. It may be remarked that the persistent study of the two cycle-engine and the double acting stroke is now beginning to bear fruit. Messrs. Swan, Hunter & Wigham Richardson, Armstrong & Co. and Harland & Wolff, have each in hand, or in view to start upon when circumstances admit, internal combustion engines for ocean service; while many other workshops throughout the country are similarly placed with regard to oil motors for smaller vessels. One or two cases have come under our observation, showing that care or forethought is not always exercised by those who fit oil motors in vessels with a view to certain results which they may consider improvements, gained mayhap from shore experience, forgetting that marine conditions are somewhat different. This comment is due to more than one disaster brought about by pipes, more or less of a suction character, being led down to the bilge or adjacent to a water service, where even a slight accumulation of water, with the vessel in a sea-way, makes its presence felt to the detriment of the machinery. The association of the Samuel Syndicate with the growing development of the oil engine is a natural sequence and will doubtless prove to be productive of good to the trade generally, as the commercial success of this engine is dependent on the cost of oil relatively to that of coal. The many great economies effected in the steam engine of to-day make it of greater importance to those interested in the oil engine, that the price of oil should be kept down, otherwise the kernel of the nut will fall to the fuel supplier and the shell to the shipowner and the engine-builder. The new Panama canal route will cater for the oil fuel steamship and for the oil engined vessel by the provision of large oil tanks and means for supplying passing vessels expeditiously with oil to suit their requirements. The controversies with regard to dues and other matters which affect the general service of the canal in respect to different nationalities will no doubt settle themselves in time by means of calm reasoning and broad minded policy. A closing note may be made to emphasise the importance of marine engineers devoting themselves to the close study of the internal combustion engine and taking advantage of all opportunities of seeing it at work.

MESSRS. MATTHEW KEENAN & CO., LTD., have completed all the boiler and pipe coverings on the s.s. *Curumpu*, launched by Messrs. Miller & MacFie. Their patent bulkhead insulation has been applied to the boiler and engine-room casings of the s.s. *Benalla* and on the same vessel they are applying their patent non-conducting composition to the boilers, pipes and flanges.

Some Modern Systems of Ship Construction.

IN recent years there has been a very refreshing movement among shipbuilders. They have broken away in many cases from the ideas obtaining so long, or have modified the usual type of vessel to make her more economical in structure, a better revenue-earner and also a more comfortable and a safer sea boat. The two latter are often by-products. The product of the pioneer naval architect's thought is a vessel in which the holds are clear of obstruction, and large hatches are possible without impairing the strength of the vessel. Sometimes the new idea takes the form of a vessel in which, by a better disposition of the material, greater strength is arrived at, or for the same strength there is a saving in weight of hull, allowing of more cargo being carried without affecting the draught or the power required for propulsion.

For a proper understanding of the principles which underlie the systems of ship-construction dealt with below, it is necessary to be quite clear as regards the chief stresses which a ship is called upon to bear, and the causes leading up to them.

The greatest longitudinal stresses which can come upon a vessel are those set up when a vessel is either supported amidships by the crest of a wave of her own length, or at the ends by the same wave whose hollow is now at the middle of length. The first case is known as "hogging," and tends to tear the vessel at the sheer strake and adjacent deck, and to crush those parts from the bilge downwards. The second case is known as "sagging," and gives rise to forces tending to tear the lower and crush the upper portion of the vessel. If a vessel is heeled over when in either of the above positions, then the region of the most highly stressed part alters, being the part farthest removed from the new neutral axis. For this reason no very definite area can be fixed for highly-stressed parts, and provision has to be made for a number of the parts being called upon to bear considerable stress at one time or another.

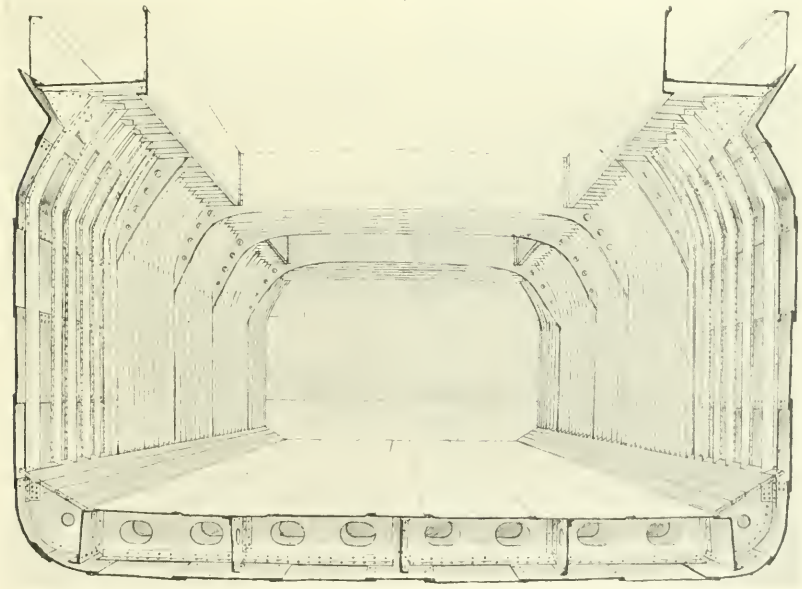
To sum up, for the resistance of longitudinal bending and shearing forces, we must have strong longitudinal parts, but the strongest must be those parts most removed from the neutral axis in all practical cases. These come at sheer strake, adjacent deck stringer plate, bilge strakes and keel.

Next consider the transverse stresses. Those on the sides of the vessel are due mainly to the water pressure, though we have also stresses produced by racking, or distortion when among waves. In addition to these, hogging and sagging set up secondary stresses in a transverse direction, as the top sides tend to come in in the case of hogging, and to go out in the case of sagging. Then there are the stresses due to dry-docking which call for great transverse strength at the bottom of the ship. Deck loads ask for considerable strength in the beams, as does also the support required by the frames. The attachment of the beam to the frame must be good, in order to cope with the racking strains.

An outline is given below of some of the main departures in recent years from the usual practice in ship construction.

The Arch Principle of Construction (Ballard Patent).

In this type of vessel the principle departure from usual practice is in the direction of transverse form, though, as will be seen later, the design includes that which tends to increased strength. Up to the moulded depth line, continued forward to about the break of the forecastle, and aft to about the break of the poop, the ordinary frames are run. From this point an arch springs, the object of this arch being to support the deck and all probable top weight, without any pillaring being necessary and at the same time to gain buoyancy and draft economically. In this way holds free of obstruction are obtained, and all the advantages of web



Perspective midship section of the Arch Principle of Ship Construction. Ayre-Ballard patent.

Photo, Frank & Sons, South Shields.

The *Thyra-Menier*. Length, 240 ft. Beam, 36 ft. 2 in. Depth, 11 ft. 1 in. Ayre-Ballard system.

framing are retained without the accompanying disadvantages of broken stowage.

The arch may also be viewed from another standpoint, that of springing downwards from the deck. In this case it is the upper end of the frame to which the arch gives support. The form of vessel resulting is an absolutely self-trimming one, and the thorough support thus given by the cargo to the frames against which it presses, stiffens the latter when in the load condition, in which case, of course, the greatest pressure of water comes upon the frames. The deck platform provided by the arch is of usual width.

In the first vessel built under this system, a longitudinal camber or reverse-sheer was given to the deck. This, however, is not an integral part of the system, which is adaptable to the ordinary sheer or no sheer, just as is desired. There are so many points of interest with regard to the vessel when built with the reverse sheer, that we will take the vessel as being so constructed.

As the deck amidships is the height of the arch above the moulded depth line, and droops from that point to the ends of the vessel, the reverse-sheer actually brings the forecastle and poop to practically the same vertical position as would have been got by adopting the ordinary sheer. There is no loss of seaworthiness, therefore, as regards the height of these parts above the water, while the weather deck amidships is raised considerably above its normal height. The advantage of this is shown in the stability curve for the vessel. Even though the vessel has no bridge, as in the type taken for comparison, and though the arched form given to the upper portion of the side cuts off the useful "deck-edge" corner, the added height of deck gives a stability curve whose maximum ordinate is slightly better than that of the comparison ship, while the angle at which maximum stability occurs, and range of stability are considerably better in the case of the Ayre-Ballard vessel.

Calculations of longitudinal strength show that the adoption of reverse-sheer and the redistribution of cargo adds greatly to strength in this direction. The reverse-sheer vessel approximates to the parabolic beam whose depth increases towards the centre at such a rate that the strength of the section keeps pace with the bending moment, giving the most economical girder possible. Thus, for a given quantity of material, this form of vessel gives a much better disposition of material to withstand the static stress which varies along the length. Again, the stresses due to pitching are lessened with this sheer, as the material is taken from the ends and massed more amidships.

The displacement of the Ayre-Ballard vessel is less than that of an ordinary vessel of the same deadweight, draught and speed. This means a smaller weight of engine to propel the reduced displacement, and a smaller bunker capacity, the coal consumption being reduced by about 5 per cent. per day.

The Ayre-Ballard vessels have proved themselves to be dry boats and very comfortable. The sloping side takes the venom out of the waves, so that their effect on the rolling is much reduced. Then the fall out of the side, due to the overhung deck, throws the waves back on themselves, leaving a dry platform. When compared with an ordinary vessel of the same deadweight, draught and speed, the Ayre-Ballard vessel showed a saving in material of some 19 per cent., meaning a reduced initial cost.

The arch principle of ship construction, as the system is called, has been applied to five vessels—*Sheaf Arrow*, *Thyra Menier*, etc. Messrs. Swan, Hunter & Wigham Richardson, are now part proprietors of the patent, with Mr. Maxwell Ballard, A.M.I.N.A., the inventor. The fastest collier on the North-East Coast is the *Sheaf Arrow*. This vessel cost £1,700 less than an ordinary vessel of the same dimensions, draught and specification, while carrying 5 per cent. more dead weight.

The "McGlashan" System.

In view of the recent discussion as to provision against foundering in the event of a raking blow from another vessel or from an iceberg, the above system is of interest, as it embodies the second skin which spells safety in many contingencies.

For a considerable portion of the length of the vessel the double bottom does not stop at the lower turn of bilge, but extends up the side to the weather deck. The capacity for water ballast of the side tanks thus formed, is about three-fourths that of the bottom tank stretching from bilge to bilge. Had the side tanks not been fitted, then the cellular double bottom would have required deepening to accommodate the extra water ballast.

The effect of this on the rolling of the vessel would have been equivalent to two equal weights placed on either side, midway between the centre line and the margin plate. Instead of this, however, these weights have been shifted from that point to nearly the side of the vessel. This "winging" of the weights has a considerable effect on the rolling, making the natural rolling period of the ship longer, so that she does not bring up sharply, but has an easy swing. The longer period gained by winging the weights has this advantage also, that the natural period of the vessel is not so likely to synchronise with the period of the waves. The danger is then avoided of the swing of the waves and ship being so timed that the impulse of the former lifts the low side of the vessel each time she commences her return swing, in which case the rolling gets greater and greater till, it may be, the range of stability is exceeded and the vessel turns turtle.

Again, by putting this portion of the [water] ballast into side tanks instead of accommodating it by increasing the depth of the ordinary double bottom, the centre of gravity of the added water ballast is raised, causing the centre of gravity (G) of the whole ship to rise. As the meta-centre (M) remains in the same position for the two cases, the draught being unaltered, then the meta-centric height (G M) is decreased. This leads to easier motion, greatly to be desired when the vessel is in ballast, or when carrying a cargo of such a density that only the lower parts of the holds are filled, a state of things which has a lowering effect on the centre of gravity of the ship, resulting in a large meta-centric height and short, distressing rolling.

Web frames are fitted at intervals throughout the length of the side tanks, and these, together with wide-plate side stringers, divide the tanks into cells. These cells add considerably to the transverse strength of the vessel. The inner skin, together with the wide-plate side stringers, gives additional longitudinal strength to the ship. The strength added in all directions by the side tanks is so considerable that the second deck may be omitted with safety. By means of these tanks the propellor can be immersed when the vessel is in ballast, so reducing the danger of racing, and allowing of a faster passage being made. In some vessels the upper portion of the side tank bends iuwards towards the centre of the vessel, thus making her self-trimming, with all the accompanying advantages. As the side tanks are exempt from tonnage dues, there is no set-off against their advantage. The builders of vessels embodying this principle are Messrs. Wm. Gray & Co., Ltd., of West Hartlepool.

The "Harroway-Dixon" System.

The distinctive feature of this type is the cantilever frame combined with wing tanks.

At about midway between the inner bottom and the deck, the frame is bent through an angle of 45 degrees, so forming a cantilever. This cantilever frame supports the deck without the need of pillars, leaving perfectly clear holds. The unsupported length of the frame is reduced to the span from the inner bottom at side to the point where the frame knuckles, so that on this account a reduction in frame scantlings is obtained. As the vessels are self-trimmers, bulk cargoes give great support to the frames, adding to their strength.

The beam is reduced in span by the support offered to it by the cantilever frame, so that, with this system no pillars are fitted, the scantlings of the beams can be reduced to that of a beam supported by two rows of pillars, its effective length being the un-supported part between the inner boundary of the topside tanks and sides of the vessel.

The space between the cantilever frame and the top corner of the hold is utilized for carrying water ballast. The wing tanks so formed are of great use when the vessel is light, they result in the vessel having a very easy motion. As the space occupied by the wing tanks is deducted from the tonnage, the wing tank is all gain and no loss.

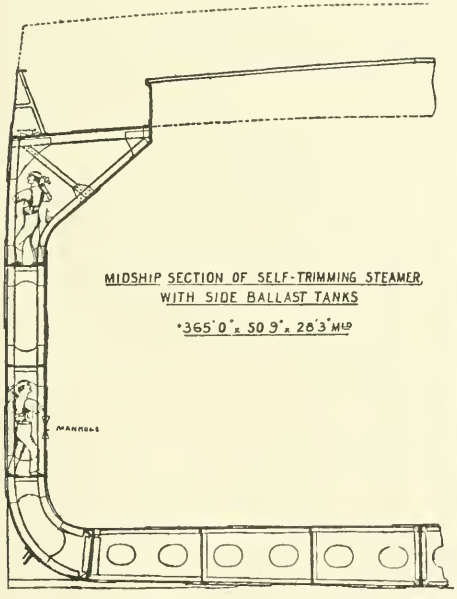
Large deck loads may be carried with safety, the form of hold keeping the centre of gravity of the cargo low, which results in the vessel having sufficient stability and yet not so much as to endanger the deck cargo by uneasy motion. There is then less tendency for the vessel when rolling to bring up sharply due to excessive stability. The sudden stoppage of the vessel's roll results in the deck cargo tending to continue its motion while the vessel herself is already on the backward roll. The result is a slacking of the lashings, if not a total breaking away of this top load. By means of the wing tanks the propeller can be immersed in every condition of loading, so that bad weather has little effect on her steaming. These tanks can be used for carrying oil or molasses if desired.

The fore and aft material used in the construction of the wing tanks adds considerably to the longitudinal strength of the vessel, and this, together with the great transverse strength got by the cantilever frames, admits of exceptionally long and wide hatchways. Hatches up to 54 ft. long and 32 ft. wide have been fitted without injuriously affecting the strength of the vessel, and these are of great advantage in the rapid discharging of coal cargoes by means of grabs. The rate of discharge under ordinary working conditions is 1,000 tons per hour. This type of vessel is indeed specially adaptable for deadweight trades, such as coal or iron ore.

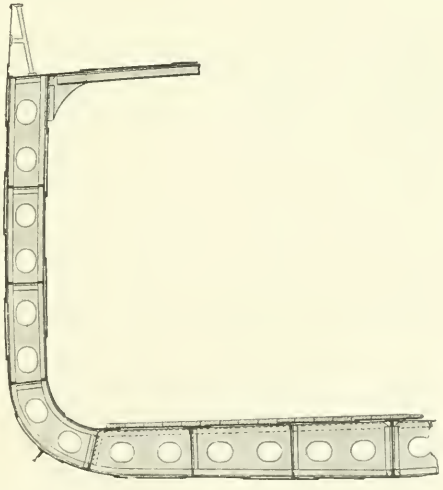
Messrs. Sir Raylton Dixon & Co., Ltd., Middlesbrough, are the chief builders of this system, though seventy-five vessels in all have been built in this country or abroad, with an aggregate tonnage of 431,000 and at a cost of over £3,000,000.

The "Isherwood" System.

In this system the great departure from ordinary practice is in the direction of longitudinal strength. The structural

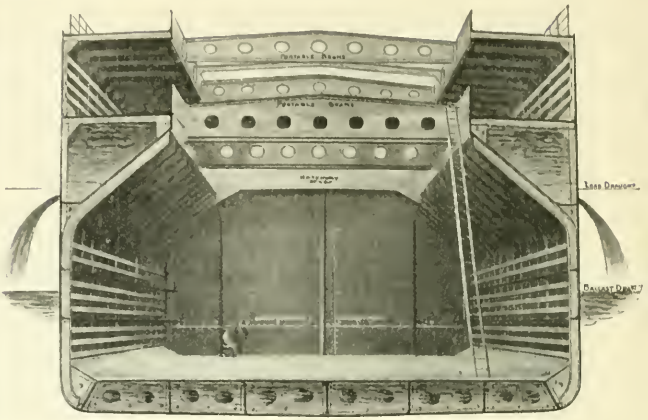


Midship section.



McGlashan's Patent Side Tank System.

Section in way of web frame.



Patent Cantilever-Framed Steamships. Harroway-Dixon System

Reproduction of model of Fore Body of single deck type. Midship section of Shelter Deck type for passengers, cattle, etc.

arrangement is such as to leave unaltered the transverse strength of the vessel, though this end is attained in a different manner from the usual. It is, however, in the increase in fore and aft strength-giving material that this system scores, and in fact the transverse members are there mainly to keep the longitudinal parts to their work. The heavy transverses, spaced about 12 ft. apart, could not contribute the necessary transverse stiffening to the intervening shell and deck, were it not that they support the longitudinal stiffeners of those parts, and so make them do the work which in the ordinary vessel is done by the frames and beams.

In the transversely framed vessel there is a decided tendency for each frame to play its part well as regards transverse strength, but to feel that its chief end is then accomplished, and that the longitudinal strength is the business of the shell and deck plating, helped to some slight extent by the stringers and keelsons or girders. In the Isherwood system each member has to do its full share of the work, as they stand or fall together.

Trouble is sometimes caused in the "transverse" vessel by the plating of the deck buckling between the beams when under compressive stress due to sagging; this is entirely prevented in the "longitudinal" vessel by the fore and aft deck stiffening. The longitudinals run continuously through all transverse members except water-tight bulkheads, to which they are efficiently bracketed so as to maintain their strength unbroken. Those to the shell are riveted to the plating, and have the spacing of ordinary transverse frames, Their strength is calculated on the assumption that they are beams whose span is the spacing of the transverses, and which are loaded with a load due to the water pressure, the surface of the water being assumed to be at the height of the gunwale, so as to allow for immersion up to that point when heeled over, or when the wave rises to that height. It will be seen that the "load" per foot of length on the longitudinal will be uniform throughout the span, but will vary with each longitudinal, being greater the farther we go down. The strength of the longitudinals can be graded to suit this requirement. Not so in the case of the transverse frame which, to be economical, should vary in strength directly as the depth, as fitted it is uniform throughout its depth. We are not talking now of strength of frame required to "fix" the ends of the beams so that they may act as built-in beams, we are taking only those frames to which no beams are attached.

The spacing of the deck longitudinals is the same as that of the beams in the ordinary vessel, so that they both have the same weight per foot of length to carry. In addition to this, however, the longitudinals have to take the stresses produced by hogging and sagging, and would in consequence require to have increased scantlings, were it not that their span is reduced to the distance between the transverses. At intervals of about 12 ft. throughout the length of the vessel heavy transverses are fitted, unless their place is taken by a bulkhead. These transverses pass unbroken round the vessel if at all possible, and are riveted to the shell plating. They are slotted to allow the longitudinals to pass. It is questionable whether, in order to make the longitudinals and transverses act in unison, any connection is needed between them, other than that offered by the shell or deck plating, as the case may be, which is effectively riveted to each set of members. The spacing of transverses referred to is found to be an economical one, as with a wider spacing the unsupported span of the longitudinals is so great that they have to be of much heavier scantlings, adding to the weight of the hull.

The great stiffening in the direction of maximum stress supplied to shell and deck by the longitudinals, results in a reduction being allowed in the thickness of the plating, when that reduction would not bring it below the minimum permissible thickness fixed by corrosion considerations. Any reduction, especially in such a heavy item as the shell plating, is much sought after. In the double-bottom floors are fitted at each transverse. These floors support the inner-bottom longitudinals, and also provide transverse strength against dry-docking. For the latter purpose, if the spacing of the transverses be great, additional floors must be fitted. Massing the pillaring is easily accomplished with this system, as pillars are only required to each transverse.

The Isherwood system is specially advantageous for large vessels of light draught, such as those trading on the River Plate, also for the ore-carriers on the Great Lakes of America. Eighty per cent. of the oil-tanker tonnage building is to the Isherwood design; this speaks for itself.

There is a great absence of vibration, probably due to the cohesion of the whole structure, together with the large amount of fore and aft material. As the amount of steel worked into the vessel is considerably reduced by the adoption of this system, the deadweight is increased on the same draught, with a consequent rise in the earning power of the vessel.

In all 240 vessels have been built or are building to the Isherwood system, having a total tonnage of about 1,078,151, and running up to 530 ft. in length for sea-going vessels, and 600 ft. for ore-carriers on the Great Lakes of America.

The "Monitor" System.

An entirely new note has been struck by the inventor of this design, and it is of the greatest interest to the naval architect, to the shipbuilder and to the shipowner. Of all those dealt with here, the present system is perhaps the easiest to describe, yet it is the one to whose results, in at least one direction, it is most difficult to assign a reason.

To the ordinary ship-shape hull there are added two longitudinal swells or corrugations, running between the load waterline and the bilge and parallel to the keel. These corrugations extend the greater part of the length of the vessel, till about the fore and the after-peak bulkheads, where they die into the usual form.

Now, what are the results obtained by this departure from the usual practice?

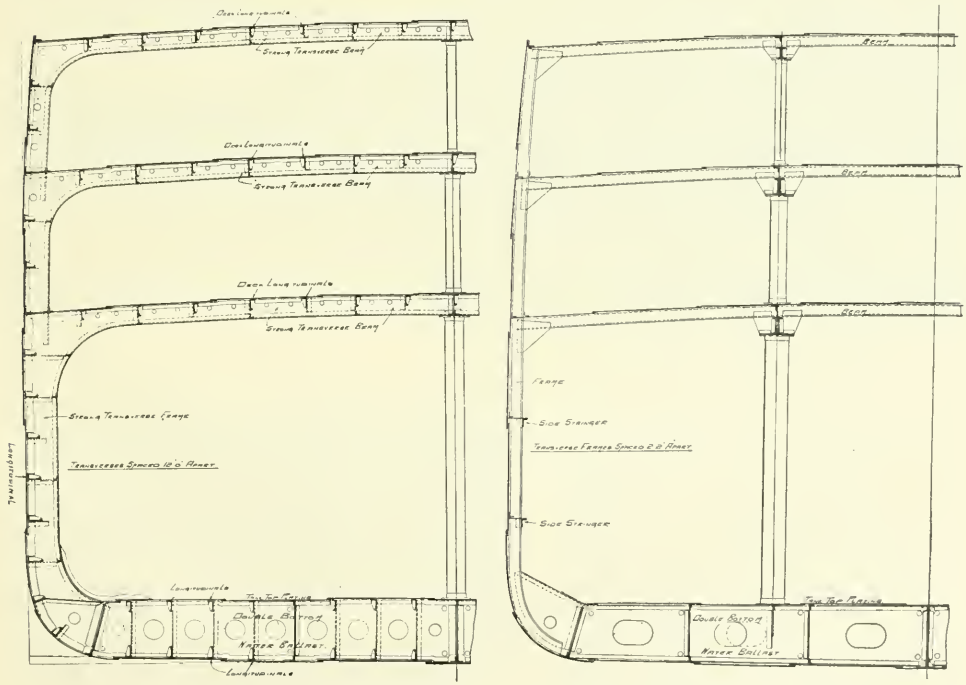
First, there is an increase in longitudinal strength, as the corrugations are practically girders added to the vessel. One or other of the corrugations will probably be of little use in this respect so far as hogging and sagging strains are concerned, being at the neutral axis, but the remaining one will add to the longitudinal strength of the vessel. Then the transverse strength is increased, owing to the stiffness due to form of the corrugations. This stiffness is so considerable that the number of frames has been reduced by at least one-half in the ships already built, and further economies can be effected. The consequent reduction in frame weight more than compensates for the increased weight of plating, due to the arc of the corrugation being greater than the chord, also for that addition to the ordinary frames required for the support of the corrugations.

Again, there is a marked improvement in the sea-kindliness of the vessel over sister ships of ordinary form. The corrugations act as rolling chocks and stop the rolling to a great extent. They take hold of a body of water as the vessel rolls and move it with more or less success in the direction of rolling. When the vessel is not going ahead, the corrugations seek to grip the still water in front of them in the direction of rolling. At first most of the water slips past the corrugations, but after a portion of the roll has been completed, the water is moving at or near the same speed as the corrugations. This means that the anti-rolling effect dies out towards the end of the roll. When, however, the vessel is going ahead, the corrugations are always meeting bodies of water at rest and have to impart motion to them in the direction of rolling. Before that motion has become considerable, in other words, before the corrugations as rolling-preventers are losing their effect, they have moved on to undisturbed water, where the work begins anew. In this way the effect of the corrugation on the rolling increases with the speed of the vessel.

The alteration in form also results in the vessel being better rooted in the water and not so liable to toss and plunge as is the smooth-sided vessel. This fixing of the vessel in the water, together with the added longitudinal and lateral stiffness due to the corrugations, probably accounts for the absence of vibration.

The corrugations, of course, add to the displacement of the vessel and also increase the wetted surface. From this one would deduce that the power required to drive this vessel would be considerably more than that required to drive her sister ship of ordinary form at the same speed. It is a remarkable fact, however, that the power required by the corrugated vessel is considerably less than that required by the plain hull. With increased displacement and, at least, no addition to the structural weight, more deadweight can be carried. This means greater earning power (the tonnage being unaltered), as does also the economy in fuel due to the same speed being obtained for a smaller horse-power. The economy in fuel also spells greater range of action.

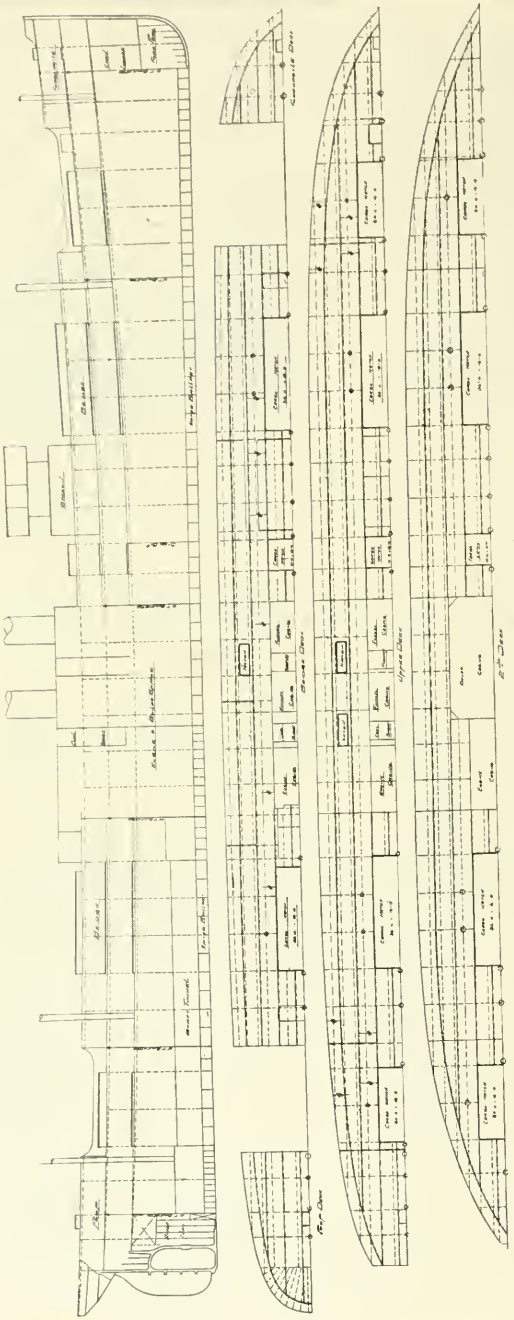
On comparison with a vessel minus the corrugations but otherwise the same, the corrugated ship shows 3 per cent. more displacement for 13½ per cent. less horse-power on the



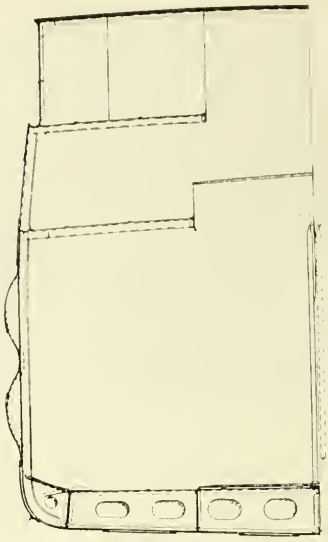
The Isherwood System of Longitudinal Framing

Midship section of general cargo steamer constructed on the Isherwood system.

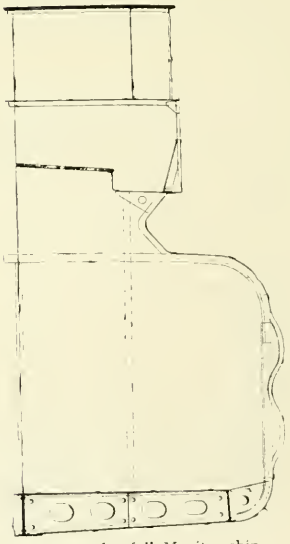
Midship section of a corresponding steamer constructed on the ordinary method.



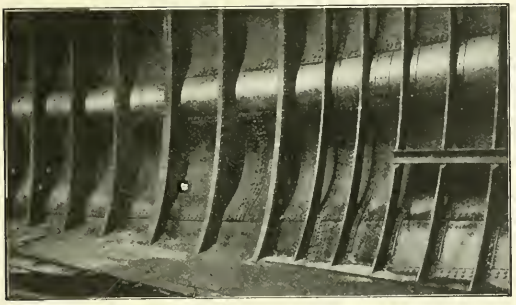
Profile of a steamer built on the Isherwood system.



The Monitor System.
Section of an ordinary vessel with Monitor Corrugations.



Section of a full Monitor ship.



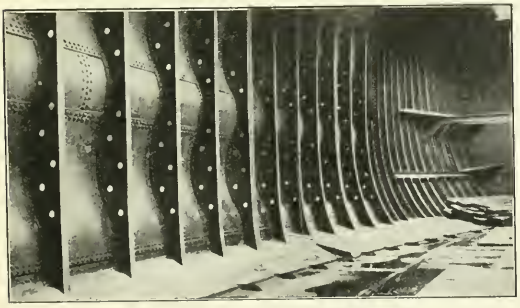
Hold of Corrugated ship looking aft.

same speed (9·79 knots), although the wetted surface is increased by 7 per cent. There is also a reduction of 6¼ per cent. in the revolutions.

As will be seen from the section shown, a "Full Monitor Ship" includes a harbour deck, the structure above which is overhung so as to provide a reasonably wide weather deck. This modification of the upper part of the vessel has the advantage discussed above that the power to cause rolling is taken out of the waves to a great extent, and that the overhanging portion, causing recoil of the wave, leaves a dry platform.

Seven corrugated vessels are either built or are building. The first of these was the *Monitoria*, which was followed by the *Hyltonia*. In the latter vessel advantage was taken of the fact that the vessel proved herself so satisfactory, and further modifications as regards reduction in weight were adopted with confidence. The builders in this country are Messrs. Osbourne, Graham & Co., of Sunderland.

The Corrugated ship.



Hold of Corrugated ship looking forward.
Showing the wider spacing allowed in way of corrugations.

MESSRS. RICHARDSONS, WESTGARTH & CO., LTD. have recently issued a booklet of Richardsons' engines (Contraflo type). The illustrations are in colours and the booklet has been produced in very excellent style.

MR. H. W. BUTLER, engineer, of Craven House, Kingsway, London, W.C., who was chairman of the Executive Committee of the Electrical Exhibition, Olympia, 1911, informs us that he has taken into partnership Mr. S. L. Bentley, M.S.I.E., Paris, representative for many years of the Electrical Power Storage Co., in the north, Scotland and Ireland. Among the sole agencies held by the firm may be mentioned those for Crocker-Wheeler Co., electric plant, Temco Electric Drills, Durvite case hardening compounds. They will continue to trade as manufacturers' agents under the style of H. W. Butler & Co., and will be pleased to hear from firms wishing to be represented in London.

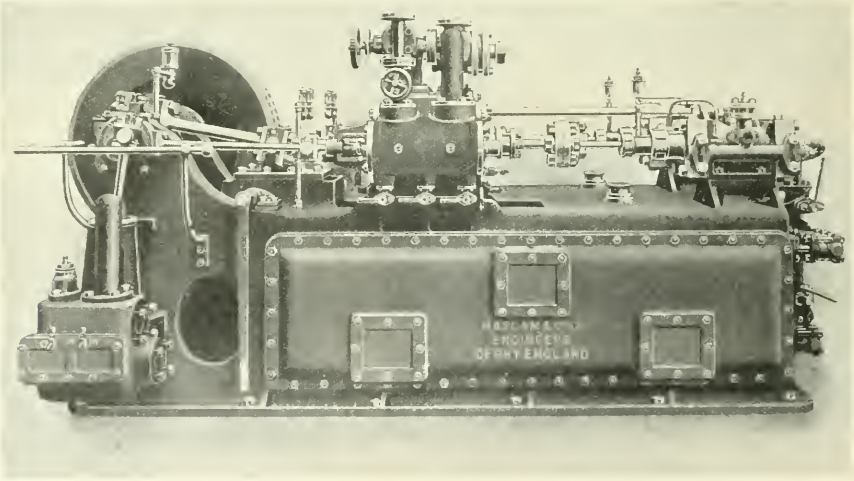
AUXILIARY MACHINERY ON THE T.S.S. "INDARRA."

THE HASLAM FOUNDRY CO

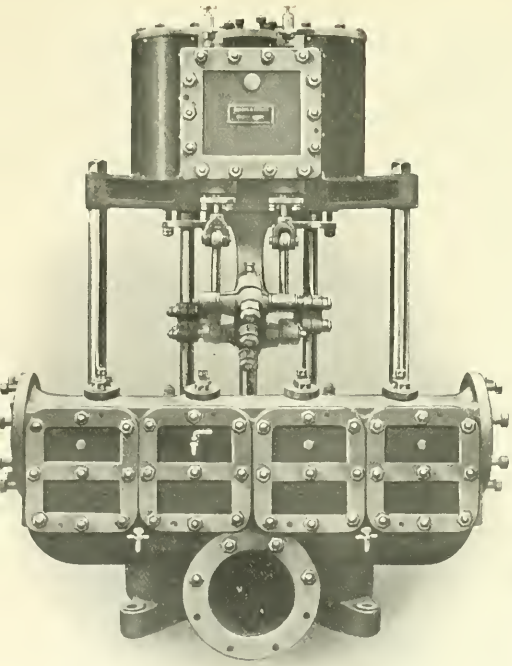
THE importance of refrigerating machinery for passenger steamers has been recognised for many years, and the pioneers among the engineering firms who experimented and developed machinery for the carriage of frozen meat and produce requiring cooled chambers, soon turned their attention to the designing of a plant to meet the obvious needs of sea travellers, whose standard of comfort and added luxuries have been rising year by year, so that the "best" of a generation ago is lower than the "fair" of the present. The Haslam Foundry Co., Derby, were early in the field making suitable machinery for meeting the requirements, and their latest type of CO_2 machine, as fitted in the steamer illustrated last month, is a type of what is being fitted in the modern liners. Preference is given in some cases to the cold air machine and such are largely in use. The capacity of these CO_2 machines is sufficient to deal with 16,000 c. ft. of insulated space, including small cargo chamber, ships's provision chamber, fruit and vegetables, butter, etc., and an ice box. A large number of Horizontal Duplex Machines have been fitted in vessels of the leading lines and the two P. & O. steamers now being built are to be supplied with this type, as illustrated and described in Messrs Haslam's catalogue. This firm has also in course of construction large CO_2 and ammonia machines for the carriage of frozen cargoes. Two new Houlder Line Steamers —*El Paraguayo* and *La Correntina* have recently been installed with a Haslam plant for cargo purposes, each being 400,000 c. ft. The illustration shows the Horizontal Duplex CO_2 machine referred to as a favourite for passenger steamers in the catalogue.

THE DIAMOND BLOWER CO.

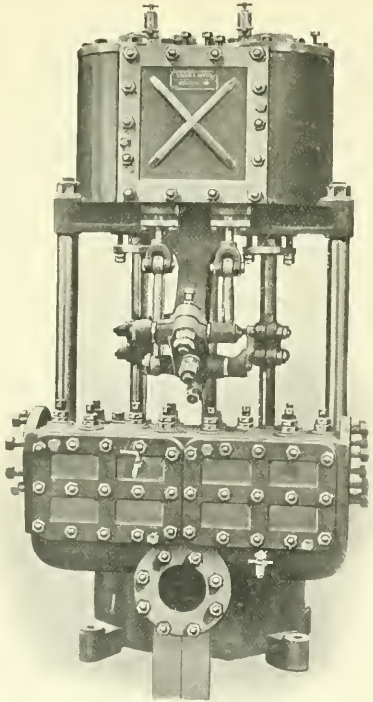
THE presence of soot or carbon deposit of any kind on the heating surface of a boiler is detrimental to its steaming qualities, as well as being against economy. This has been proven on so many occasions that further comment is hardly necessary, but the method of removing soot has for a long time been a serious obstacle to the marine engineer, as the old methods required the lowering of steam in the boiler and the cleaning of the tubes through the smoke-box door. This not only resulted in a considerable loss of power while the boiler was out of service, but it also meant the danger of leaking tube ends, due to expansion and contraction, and, furthermore, involved hard and laborious work on the part of the fireman. Of recent years, however, the old system has been rapidly supplanted by a very ingenious machine, which is installed in the rear end of the boiler, and which is used while the boiler is under full pressure. This was mentioned in our recent illustrated notes on the t.s.s. *Indarra*, and we are informed by the manufacturers that most of the principal liners trading in Australian waters are fitted with this machine, which has now been adopted by nearly all the leading European Lines, and very many warm endorsements have been received to testify to the economy in fuel and labour and increase of speed resulting from the increased efficiency of the boilers. It is a well-known fact that many of the vessels now in service were built before such heavy claims were made upon them, steam generators, refrigerating machinery, dynamos and so forth have been added, and there are very few vessels now in service that are not, to a certain extent, under-boilered, and for vessels of this type the Diamond Steam Flue Blower, which is the apparatus referred to, is an absolute necessity. Most of the new vessels now being built in the North have this machine specified, and it is rapidly being recognised as a standard fitting to the modern boiler.



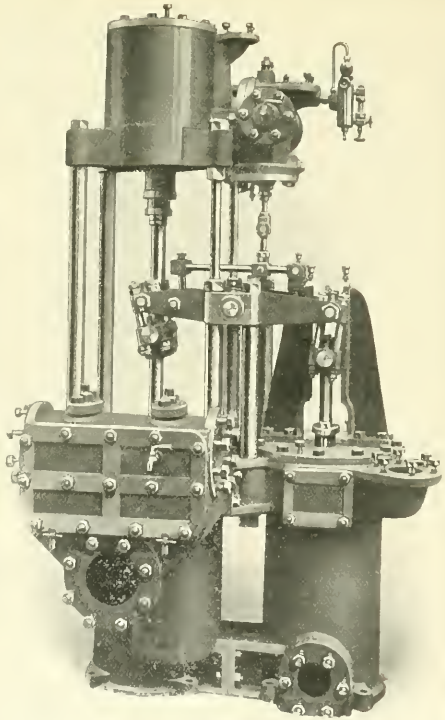
The Refrigerating machinery on the T.S.S. *Indarra* is of Messrs. Haslam & Co.'s latest horizonal duplex CO_2 type.



Vertical Duplex Pump, Ballast or Low Service.
(Messrs. Dawson & Downie.)



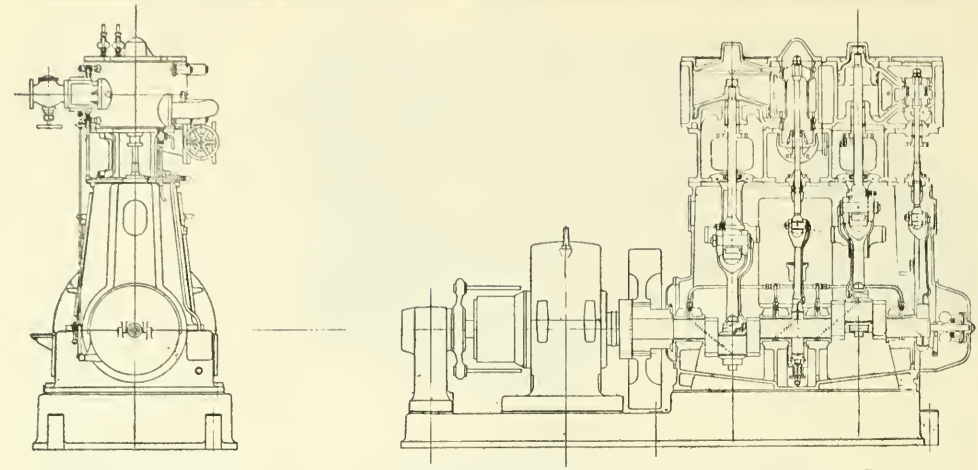
Vertical Duplex Pump, Boiler Feed or General Service.
(Messrs. Dawson & Downie.)



Direct Acting Air and Circulating Pumps (Dawson's Patent.)
(Messrs. Dawson & Downie.)

[MESSRS. DAWSON & DOWNIE.

AUXILIARY Machinery has been gradually gaining ground in importance in connection with the main engines, and now we find many engine rooms where the old pump levers find no place whereon to rest. The firm of Messrs. Dawson & Downie was noted last month as having supplied pumps to the *Indarra* and these we now have an opportunity, by the courtesy of the firm, to describe in detail. One set of combined direct acting air and circulation pumps for the auxiliary condenser,—which deals with the exhaust from the machines working in port,—the steam cylinder is 10 ins. diam., air pump 15 ins., circulating pump 12 ins. with a stroke of 12 ins. The steam admission valve is one of the firm's patents, specially designed for the varying load. The feed pump attached to the condenser has a Steam cylinder of 6 ins. diam., pump $4\frac{1}{2}$ ins., stroke 6 ins. In addition to this set of pumps, Messrs. Dawson & Downie supplied the following, 2 vertical duplex bilge pumps, with cylinders 8 ins. diam., pump $8\frac{1}{2}$ ins. and 10 ins. stroke, 2 ballast, 2 sanitary, 1 hot water and 2 fresh water pumps, each with steam cylinders of 7 ins., pump 7 ins. and 18 ins. stroke. These pumps are shown in the illustration, for reproducing which we are indebted to Messrs. Dawson & Downie.



Messrs. Alexander Shanks & Son, Ltd., Compound Vertical Enclosed Engine, coupled to a 73 K W Siemens' Dynamo.

MESSRS. ALEX. SHANKS & SON (LIMITED).

IN our December issue we illustrated in the descriptive article on the T.S.S. *Indarra*, the electric-light machinery fitted in this ship, and now by the courtesy of Messrs. Alex. Shanks & Son, the builders of the engines coupled to the Siemens' dynamos, we are enabled to reproduce a drawing showing the proportions more clearly than the photograph, with the switchboard and dynamo shown. The engines are of the compound vertical enclosed type, with cylinders 10 in. and 19 in. by 8 in. coupled to Siemens' dynamos, 73 K.W. at 400 R.P.M. There are three sets of these combined plants fitted in the engine room, the current being required for both light and power, including the wireless operator's plant. The working steam pressure was reduced from the boiler pressure of 210 lbs. to 100 lbs. at the dynamo engines, but these were designed and built for the full pressure named. Opportunities have been afforded us of seeing similar electric lighting plant on other steamers, coupled to Siemens' dynamos and to those of other electrical firms. Some engineers prefer the open and and some the enclosed type of engine, but in each case the verdict of those in charge was such that we have pleasure in giving the illustration in our pages.

THE "NON-LEAK" JOINTING COMPOUND.

IT is generally recognised that the most efficient joint that can be made between the metal faces of flanges is one, only or largely composed of metal, so that the conditions of metal to metal are maintained to the fullest extent.

Messrs. J. E. Turner & Co., Ltd., of Bradford and London, are manufacturers of a jointing under the title of "Non-Leak" which is in the form of a powder and is largely composed of metal, so as to approach as near as possible to a metal-to-metal joint. It is claimed that joints can be disconnected without any damage to the metal faces and steam can be turned on directly the joint is screwed tight, and the joint is of such a character as to be absolutely permanent if so required. It will give good results at both high and low pressures and with super-heat, and above all its use effects the saving of from 50 to 75% on the cost as compared with sheet joints. A typical illustration of this comparison is put forward which shows that a joint, which with patent sheet jointing costs 12/6, can be made with non-leak jointing compound at the cost of 2/1. If the flanges to be jointed are in such a bad condition as to render it difficult to effect a satisfactory jointing result with the non-leak compound, the difficulty would be overcome readily by the use of corrugated rings, so as to make up any differences between the faces.

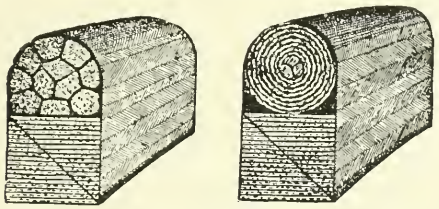
THERMO-FEED REGULATOR.

IT is interesting to note that the Thermo-Feed Regulator is making rapid strides in public favour under the guidance of the enterprising firm of Messrs. Ronald Trist and Co., Ltd., who appear to leave no effort unturned to deal with each new condition as it arises. We understand that some of these regulators are being supplied for use on board some of the super "Dreadnoughts" now under construction. Not only are the merits appreciated in this country, but in other parts of the world as well, for no fewer than seven continental firms are manufacturing them under license and repeat orders have come in from Mauritius, Brazil, Chili, United States and Canada. The orders executed in the last quarter of the year are six times those of the first quarter. The most recent improvements are the provision of nickel of 99% purity for the control valve and its seats, and the arrangement of the steam pipe of U formation on to a central connection, so that any portion of the gear can be disposed at any point around a circle as circumstances may require. This latter arrangement has proved to be one of the greatest utility in fixing the regulator in all kinds of situations and under great variety of circumstance.

B.P.C. SECTIONAL PACKING.

THE great aim of engineers in charge of steam plant is to as far as possible reduce the trouble and nuisance of repacking glands, particularly of high-pressure rods. To this end the British Packing Company, of Queen Anne's Chambers, Westminster, supply a sectional packing of the self-setting type. The accompanying diagrams show, sectionally, the construction of both the high and low-pressure packings. These are produced by combining two diagonally-cut wedges of high-grade rubber-frictioned duck, with an absorbent flax cushion. The special function of the wedges is to slip easily on each other, and so adapt themselves to any unevenness of the rod due to scoring or wear. The absorbent cushion is saturated with lubricating oil, incorporated with graphite, and is of such a character as to absorb and retain oil fed to a stuffing box on the rod, or in any other way. The glands can be left loose, thereby reducing friction to a minimum and extending the life of the packing to an extraordinary term, as well as giving a compensating packing pressure at all points of the stroke.

Amongst the other specialities of this Company, mention may be made of their "Reddite," The Ideal Jointing Material. It is claimed that "Reddite" is capable of resisting the highest temperatures (as long as it is not exposed to the flame) and pressures of up to 900 lbs. per square inch. It makes a very efficient



B.P.C. Packing.

safe joint in pipes, flanges, cylinder covers, steam-chest covers, valves, boiler joints, etc., where either steam, gas, water or compressed air is used. It cannot blow out if properly packed, and has the enormous advantage that pressure will not expand it. It is not altered either in its size or shape, it does not contract, and therefore does not obstruct the free passage of a joint. It obviates the necessity of frequently tightening bolts and nuts, while it possesses great power of resistance against wear and tear, and can with care be used many times over, especially if graphited.

Its extraordinary durability and reliability in working should make it cheaper than other packings of less durability, though some may appear considerably less expensive at first sight, but experience will soon prove where the advantages really reside.

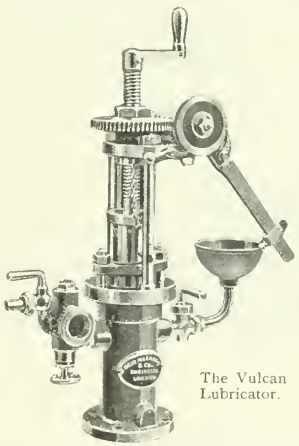
WEBSTERS, LTD., HULL.—The old-established firm of Websters, Ltd., have had a busy year during 1912. A large number of vessels have been coated with the firm's well-known compositions and the company is making considerable progress and rapidly increasing its connection among shipowners at home and abroad. Websters' compositions have been on the market now for nearly sixty years, and thus have stood the test of time.

THE IMPROVED "VULCAN" AUTOMATIC PLUNGER LUBRICATOR.

THE old-fashioned method of lubricating cylinders by oil cups is now practically a thing of the past, as it involves a great waste of oil, owing to the fact that after a few strokes of the engines the oil is carried away, leaving the piston and slide valves practically dry, consequently the purpose of the oil is lost.

Messrs. Reid, Meeking & Co., of Leadenhall Chambers, St. Mary Axe, London, E.C., who put the Vulcan lubricator on the market, are now supplying an improved form, embodying some useful features. The improved construction ensures that at each stroke of the engine an exact quantity of oil, which can be regulated through a wide range to a nicety, is delivered, and thus certainty of lubrication is effected, although the supply is carried on under conditions of the highest economy.

In some types of pump lubricators the conditions entail that in the event of the engineer neglecting to stop the operation and screw the piston up before it reaches the end of the cylinder, either the bottom of the cylinder will be forced out or some other part of the mechanism will be broken. In the improved Vulcan lubricator this serious fault is overcome and provided against in an extremely simple manner, by the arrangement of a wedge which forms a connecting link between the vertical screw and the piston. When the lubricator is started the wedge is put into operative association so that the piston is forced down by the screw; however, when the piston nears the bottom of its stroke the wedge comes into contact with a projection and is forced out, thus breaking the connection



The Vulcan Lubricator.

between the vertical screw and the piston before the end of the stroke is reached. Under these conditions the vertical screw with the nut attached only revolves idly while the piston remains stationary. There is evidence of the popularity of this lubricator among ship-owners in this country, and it is interesting to note that there are at the present time over 20,000 lubricators in use. The adjoining illustration is a representation of the improved form, and the general arrangements are so well known that no further description is necessary.

OBITUARY.

Mr. Asplan Beldam.

It is with regret that we have to record that Mr. Asplan Beldam, the founder of the Beldam Packing and Rubber Company and an engineer of well-known reputation, died somewhat suddenly on December 16th. Thus has been removed from the engineering world one who was esteemed for his pleasant personality and kindly manner, ever ready to help forward a good cause. Born at Bluntisham, on the border of Huntingdon and Cambridge, in 1841, he served his apprenticeship with Kitson, Thomson & Hewitsons, locomotive engineers, Leeds. He then turned to marine work and was employed at Miller & Ravenhill's, The General Steam Navigation Co. and J. Perin & Sons, Greenwich. He was afterwards manager of The Worcester Locomotive

Mr. Asplan Beldam.

and General Engineering Works and in 1867 he became manager of shipbuilding and engineering works at Northfleet. Two years later he joined the firm of Geo. Forrester and Co., Liverpool. Previous to his removal to Liverpool he designed and saw carried to successful completion a set of machinery for the manufacture of glucose and saccharine. In 1872 he was appointed superintendent of the "Flower" line of steamers, and on leaving Liverpool he was presented by those who had served under him at Messrs. Forrester's with a handsome testimonial of their esteem. He was a consulting and superintending engineer for various steamship owners besides the "Flower" line, as the Castle line (Messrs. Skinner), Money Wigram, Eastern Telegraph Co., Scandinavian Co. and others. One notable vessel which he designed and superintended was the *Stirling Castle*, which attained to fame for her speed, and brought home 6,000 tons of tea from Hankow in 28 days, beating the previous best record by more than a week. The specialities he brought out from time to time are well known in connection with both land and marine engine practice. It may be interesting to observe that in 1867 he designed two vessels with engines and boilers to work at 110 lbs. steam pressure, and four years later patented a boiler to work at 150 lbs. pressure, thus showing his pioneer efforts in the direction of economy. With the same object in view he turned his attention to packings in order to reduce friction to a minimum and keep steam-tight glands, while he also patented a metal valve for pumps and an anti-clinkering fire bar. The gold medals and certificates gained at exhibitions for the various manufactures of the firm are many in number, and prove merit and enterprise. When the Institute of Marine Engineers was inaugurated at Stratford, he took a great interest in the foundation work, spent time and labour as a member of the Committee, and on the successful formation of the Institute he was elected President. Thus to him is due the honour of having been the first President of the list which bears so many great and distinguished names in succession. He continued to retain his association and interest in this Society, believing that its operations were for the advancement of the sea-going engineer and marine engineering. He was present at the last annual dinner held in November and occupied his usual position in virtue of his office as number one Past President, a position allotted to him from the date of the first similar event when the late Dr. P. Denny was President and occupied the chair. Mr. Beldam was also a member of the Institution of Mechanical Engineers and the Institution of Naval Architects. He was also a member of the London Chamber of Commerce, and his opinion and advice as an arbitrator were frequently sought, for his fair and impartial judgment.

Mr. W. D. Cruickshank.

WE have received with regret an intimation of the death, on November 11th, at Balmain, Sydney, of Mr. W. D. Cruickshank, an engineer well known personally to many of our readers, whose business has led them to New South Wales, and by name to many others for his work on boiler construction, published about 1896, a new edition of which was issued within the last two years or so. Born at Aberdeen in 1837, he served his apprenticeship with Messrs. Armstrong & Co., Newcastle, then went to sea, obtained his Board of Trade Certificates, and while serving as 2nd engineer he remained on the Australian coast service about the year 1866. He was afterwards appointed as an engineer on the Marine Board and on the retirement of Mr. Broderick, he was promoted to the position of engineer-in-chief to the Board—an appointment which included the examinations of engineers for certificates of competency. His opinions and advice were esteemed not only in marine engineering circles but in connection with railway matters, and especially boiler construction. For some years past Mr. Cruickshank suffered from partial paralysis and was unable to hold free converse with his visitors, although his movements to and fro were not affected. Such was his popularity and the esteem in which he was held that his friends and comrades maintained a sympathetic interest in him to the last. He was one of the founders of the Balmain Bowling Green, in which he took a keen interest; he held several trophies of his skill as a bowler. He was a member of the Institute of Marine Engineers (Incorporated) and an honorary associate (Sydney Branch) of the Australasian Institute of Marine Engineers.

FOREIGN NOTES.

France.

AT the French Government shipyards the following war vessels are in course of construction, namely, six battleships, six destroyers, twenty-seven submarines, three floating docks, and at private shipyards five battleships, eight destroyers, two mine layers, one river gunboat, one transport and one despatch boat.

The Chantiers de Normandie have just received an order from the Compagnie Transatlantique for a mail boat of the following dimensions:—Length, 130 m.; beam, 15·60 m.; of 6,600 tons, which is to be named *Porto Rico*. The vessel is

to be used for the postal service between Havre and the Antilles, and her engines are to develop 4,500 h.p , giving the vessel a speed of 17 knots. To the order of the same company the *Mississippi* has been launched at this shipyard for service as a cargo boat between Havre and Mexico. The same yard has received further orders from the Petrole Transport Co., for an oil-tank steamer and three cargo boats of 16,000 tons each.

The Compagnie Générale Transatlantique has just placed an order with the Chantiers de Provence for a mail steamer for the Antilles line. This boat will be 171 m. long with a beam of 19.5 m. The propelling machinery will be a combination of reciprocating engines and turbines. Accommodation is to be provided for over 1,500 passengers.

Germany.

The *Horncap* was recently launched successfully at the Koch shipyard at Luebeck, where she has been built to the order of the shipping firm Horn of Luebeck. She has a carrying capacity of 6,250 tons and is fitted with a triple-expansion engine of 2,000 h.p., which will give the vessel a speed of 12 knots.

The Hamburg-America Line has purchased the steamer *Turkistan* from the shipping firm of Stuck & Co., of London. She is of 7,000 tons carrying capacity and was built in 1911 in England. Her speed is 13 knots.

The firm of Friedr. Krupp, Ltd., at Essen, the well-known steel works, has just published its annual report. The general meeting sanctioned the dividend of 12 per cent. for 1911-12 against 10 per cent. for the preceding year.

The launch of the cargo steamer *Luneburg* has just been satisfactorily effected at the Tecklenborg shipyard, where she has been built to the order of the German Australian Steamship Company. Her carrying capacity is 9,600 tons, her length being 142·8 m., beam 17·4 m. She will be propelled by a triple-expansion engine of 3,750 i.h.p., which is supplied with steam by four boilers fitted with Howden's forced draught and will attain a speed of 12½ knots. The Howaldt shipyard at Kiel has just successfully launched a motor tank-steamer built to the order of the German-American Petroleum Company. At the launch the steamer was given the name of *Sioux;* the carrying capacity of the vessel is 7,000 tons and her motor will develop 3,000 h.p.

The German Steamship Company "Kosmos" has placed an order for two cargo and passenger steamers with the Flensberg shipyard and two vessels of a similar kind with the Tecklenborg shipyard at Geestemunde.

Orders for two cargo steamers have been placed with the Bremer "Vulkan" at Vegesack and for one with the "Weser" shipyard at Bremen by the Hamburg South American Steamship Company. The carrying capacity of each vessel is to be 9,000 tons. The same company has further steamers to its order in course of construction, one of 12,000 tons with the Reiherstieg Co., another of 16,000 tons with the Vulkan Co., the third also of 16,000 tons with Messrs. Blohm and Voss, and the fourth of 12,000 tons with the Bremer Vulkan shipyard. These vessels are to serve as cargo and passenger steamers.

The *Sierra Cordoba* a twin-screw steamer, has just been successfully launched by the Vulkan shipyard at Stettin, She is to do service as cargo and passenger steamer on the South American line. Her length is 133·5 m., her beam 17·0 m. and on a draught of 8·0 m., her carrying capacity will be 8,300 tons. A speed of 13 knots will be provided by two three-cylinder triple-expansion engines, developing a total i.h.p. of 4,300. The *Sierra Cordoba* is provided with all modern improvements, including a wireless plant and a submarine sounding apparatus. Accommodation is provided for 116 first class passengers, 74 2nd class and 1,270 between decks.

The *Stumfels* a cargo steamer, has recently satisfactorily completed her trial runs. The vessel has been built to the order of the German Steamship Company "Hansa," at Hamburg, for the service to the Far East, and has a carrying capacity of 9,000 tons. The quadruple-expansion engine fitted will give the *Sturmfels* a speed of 14 knots.

Denmark.

The Burmeister & Wain shipyard at Copenhagen, has just launched a twin motor vessel, named *Suecia*, of 6,500 tons carrying capacity, built to the order of the shipping company "Nordstierenan," for their La Plata service. Her length is 110 m., beam 15.6 m. and the vessel is to be fitted with two eight-cylinder four-cycle motors on the Diesel system of 1,000 i.h.p. each. The same firm has ordered three further motor steamers of the same size.

Norway.

A new building plan for the fleet provides for the construction of six armoured cruisers, six destroyers, forty torpedo boats and twelve submarines. These are in addition to the two battleships and two submarines voted last year. The work on these vessels is to be carried out as speedily as possible and enquiries are being made of foreign shipyards, so that the orders may be placed without delay.

Japan.

The battle cruiser *Hiyei* has just been successfully launched at the Yokosuka shipyard. The *Hiyei* has a displacement of 27,500 tons and is to be fitted with machinery of 64,000 i.h.p. Two submarines have been ordered in France, which are to have a displacement of 350 tons. Their outfit is to include all latest improvements necessary for the safety of the crew. Two destroyers have been ordered in England of 600 tons displacement, to be fitted with turbines.

Portugal.

It is reported from Lisbon that the Portuguese Admiralty is inviting tenders for the construction of two cruisers of about 2,300 tons, six destroyers of 700 to 800 tons, three submarines of 300 tons and a vessel for the purpose of lifting sunken submarines of 800 tons. All particulars of these vessels are said to have been communicated to the leading English shipyards, which are probably to be entrusted with the construction of the vessels.

Turkey.

The *Nusrat* has just been launched at the Germania shipyard at Kiel, to the order of the Turkish Government, to be used for the purpose of laying mines. The length of the vessel is 40 m. and her speed is to be 15 knots. She will be equipped with eight machine guns.

Holland.

The Steamship Company "Nederland" has placed orders for two cargo steamers of 9,700 tons in England, one with Messrs. Wm. Gray & Co., at West Hartlepool, and the other with Messrs. Hamilton, at Glasgow. The "Nederland" has now no less than ten vessels in course of construction at various shipyards, which are partly intended for passenger and for cargo purposes. The *Juno*, a motor tank vessel of the Anglo-Saxon Tank Company, has just completed its trial runs with success. The motor, of the four-cycle Werkspoor type, develops 1,100 h.p., and has six cylinders. The *Juno* is 78·6 m. long, with a beam of 13·7 m., and a carrying capacity of 2,375 tons. At the trial runs the vessel attained 10·5 knots.

STEEL TUG "JUBILEE."
Built by Messrs. Isaac J. Abdela & Mitchell, Ltd., Queen's Ferry, Chester.

This little craft was launched with steam up for trial trip and shipped to Karachi within 48 hours.

Summary of Shipbuilding Returns of United Kingdom in 1912, arranged in order of Tonnage built by each Firm.

No.	Name of Firm.	Place	No. of Vessels.	Total Tons.
1	Swan, Hunter & Wigham Richardson, Ltd.	Tyne	21	126,152
2	Wm. Doxford & Sons, Ltd.	Wear	18	92,482
3	Workman, Clark & Co., Ltd.	Belfast	9	85,891
4	Harland & Wolff, Ltd.	Belfast	7	77,591
5	Cammell, Laird & Co., Ltd. Birkenhead and Tranmere	Mersey		77,092
6	Russell & Co.	Clyde	13	71,224
7	Northumberland Shipbuilding Co., Ltd.	Tyne	12	62,130
** 8	Palmer's Shipbuilding & Iron Co.	Tyne	7	58,902
9	Scott's Shipbuilding & Engineering Co., Ltd.	Clyde	9	58,314
10	Vickers, Ltd.	Barrow		52,860
11	Irvine's Shipbuilding & Dry Docks Co., Ltd.	Hartlepool	11	52,110
12	Gepner & Son.	Tees	10	49,126
13	Barclay, Curle & Co., Ltd.	Clyde	8	43,112
14	Sir W. G. Armstrong, Whitworth & Co., Ltd.	Tyne	8	41,535
15	Wm. Hamilton & Co., Ltd.	Clyde	7	40,029
16	Joseph L. Thompson & Son, Ltd.	Wear	8	37,749
17	R. & W. Hawthorn, Leslie & Co., Ltd.	Tyne	7	37,460
18	Fairfield Shipbuilding & Engineering Co., Ltd.	Clyde	4	36,626
19	Caird & Co., Ltd.	Clyde	4	35,936
20	Wm. Denny & Bros.	Clyde	8	33,925
21	Short Bros., Ltd.	Wear	6	32,731
22	Craig, Taylor & Co., Ltd.	Tees	6	30,817
23	J. Readhead & Sons.	Tyne	6	30,187
24	Alexander Stephen & Sons, Ltd.	Clyde	3	28,611
25	D. & W. Henderson & Co., Ltd.	Clyde	5	27,768
26	Earle's Shipbuilding & Engineering Co., Ltd.	Humber	12	26,189
27	A. McMillan & Son, Ltd.	Clyde	6	26,111
28	Sunderland Shipbuilding Co., Ltd.	Wear	7	24,078
29	Greenock & Grangemouth Dockyard Co.	Clyde & Forth	10	23,586
30	Sir James Laing & Sons, Ltd.	Wear	5	23,538
31	Sir Raylton Dixon & Co., Ltd.	Tees	3	23,467
32	Bartram & Sons.	Wear	5	23,856
33	John Brown & Co., Ltd.	Clyde	6	22,782
**34	Wm. Beardmore & Co., Ltd.	Clyde	3	21,500
35	Robert Thompson & Sons, Ltd.	Wear	6	19,221
36	J. Blumer & Co.	Wear	5	18,973
37	Napier & Miller, Ltd.	Clyde	7	15,161
38	R. Duncan & Co., Ltd.	Clyde	4	15,059
39	Ailsa Shipbuilding Co., Ltd.	Clyde	9	14,935
40	Wm. Pickersgill & Sons.	Wear	4	13,783
41	Tyne Iron Shipbuilding Co., Ltd.	Tyne	3	12,537
42	Wm. Dobson & Co.	Tyne	4	12,230
43	Blyth Shipbuilding & Dry Docks Co., Ltd.	Tyne	4	12,215
44	London & Glasgow Shipbuilding Co.	Clyde	3	12,210
45	Caledon Ship & Engineering Co., Ltd.	Tay	8	12,133
46	Osbourne, Graham & Co.	Wear	6	11,408
47	Mackie & Thomson, Ltd.	Clyde	15	11,320
48	Wood, Skinner & Co., Ltd.	Tyne	6	10,945
49	Smith's Dock Co., Ltd.	N. Shields	30	10,029
50	Clyde Shipbuilding & Engineering Co., Ltd.	Clyde	5	8,831
51	S. P. Austin & Son, Ltd.	Wear	4	8,420
52	Cochrane & Sons.	Humber	37	8,242
53	Goole Shipbuilding & Repairing Co., Ltd., and Associated Firm Dundee Shipbuilding Co.	Goole	27	8,111
54	Simons & Co., Ltd.	Clyde	10	7,643
55	Lobnitz & Co.	Clyde	14	7,100
56	Dunlop, Bremner & Co., Ltd.	Clyde	4	7,025
57	Cook, Welton & Gemmell, Ltd.	Humber	27	7,011
58	Wm. Harkess & Son, Ltd.	Tees	9	6,630
59	Rennie Forrestt Shipbuilding Co., Ltd.	Wivenhoe	34	6,104
60	Mackay Bros.	Forth	3	5,331
61	Hall, Russell & Co.	Aberdeen	19	5,196
62	J. Samuel White & Co., Ltd.	E. Cowes		4,476
63	John Crown & Sons, Ltd.	Wear	3	4,267
64	A. W. Robertson & Co.	Thames	23	4,233
65	John I. Thornycroft & Co., Ltd.	S'ton		3,100
66	Ferguson Bros.	—	4	2,980
67	R. Williamson & Sons.	Mersey	4	2,823
68	Alley & MacLellan, Ltd.	Clyde	—	2,750
69	The John Duthie Torry Shipbuilding Co.	Torry (Dee)	17	2,609
70	Scott & Sons.	Clyde	8	2,600
† 71	Murdock & Murray.	Clyde	7	2,521
† 72	J. P. Rennoldson & Sons.	Tyne	8	2,230
73	Lytham Shipbuilding & Engineering Co., Ltd.	Lytham	15	2,198
74	C. H. Walker & Co., Ltd.	Chepstow	20	2,131
75	W. J. Yarwood & Sons.	Mersey	13	1,819
* 76	Hawthorns & Co., Ltd.	Forth	6	1,810
77	Alex. Hall & Co., Ltd.	Aberdeen (Dee)	11	1,803
† 78	Edwd. Finch & Co., Ltd.	Chepstow	17	1,790
† 79	John Chambers.	Lowestoft	20	1,669
† 80	Dublin Dockyard Co.	Dublin	3	1,641
81	Edwards & Co., Ltd.	Thames	23	1,361
82	Isaac Abdela & Mitchell, Ltd.	Mersey	14	1,340
83	A. & J. Inglis, Ltd.	Clyde	2	1,333
84	W. H. Warren.	Humber	13	1,205
85	Jos. Scarr & Sons, Ltd.	Humber	8	1,145
86	Crabtree & Co., Ltd.	Gt. Yarmouth	6	1,062
87	Joseph T. Eltringham & Co.	S. Shields	3	1,029
88	George Brown & Co.	Clyde	6	1,010
89	Ardrossan Dry Dock & Shipbuilding Co.	Clyde	3	951
90	Henry Scarr.	Humber	7	920
91	Beaching Bros., Ltd.	Thames	8	800
92	Hepple & Co., Ltd.	Tyne	7	758
93	Isaac Pimblott & Sons.	Mersey	25	686
94	Fellows & Co., Ltd.	Gt. Yarmouth	6	550
95	Philip & Son, Ltd.	E. Channel	11	460
96	John Cran & Co.	Forth	5	369
97	Ritchie, Graham & Milne.	Clyde	5	315
98	Camper & Nicholson, Ltd.	Gosport	4	228
† 99	Larne Shipbuilding Co.	Larne	1	125
†100	Montrose Shipbuilding Co., Ltd.	Tay	1	100
*1	W. Gray & Co., Ltd.	Tees	20	90,272
*2	Richardson, Duck & Co., Ltd.	Tees	8	39,388
*3	John Priestman & Co.	Wear	5	22,240
*4	Fleming & Ferguson, Ltd.	Clyde	12	9,300
*5	Campbeltown Shipbuilding Co.	Clyde	4	8,554
*6	John Fullerton & Co.	Clyde	4	2,121
	Yarrow & Co., Ltd.	Clyde		

1,008 tons, but in addition warship tonnage not given.

† Board of Trade gross tons register.
* Board of Trade gross tons register, including erections.
†† Includes Floating Docks
** Displacement tons.

List of Vessels Launched and Engined in 1912.

ENGLISH.

THE TYNE.

Sir W. G. Armstrong, Whitworth & Co., Ltd., Newcastle-on-Tyne.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. incln. erect.	I.H.P.
Alfred Nobel, screw	Steel	Norwegian	4,770	—	2,330
Clio, screw	,,	German	5,576	—	3,030
Comanchee, screw	,,	British	5,588	—	3,030
Shwedagon, screw	,,	,,	3,391	—	1,300
Adorna, screw	,,	German	6,330	—	2,900
Clan Macarthur and Clan Mactavish, screws	,,	British	5,815ea	—	5,200ea
Herbert G. Wylie, screw	,,	—	4,250	—	2,000

The Blyth Shipbuilding & Dry Docks Co., Ltd., Blyth.

† West Wales, screw	Steel	British	4,332	—	2,350
† Sheaf Arrow, screw	,,	,,	2,094	—	1,700
† Inglemoor, screw	,,	,,	4,332	—	2,350
† Thyra Menier, screw	,,	,,	1,457	—	745

Jos. T. Eltringham & Co., South Shields.

Central No. 2, screw str.	—	British	137	—	750
Wyola, screw steamer	—	,,	306	—	1,150
Robert Hastie, screw str.	—	,,	209	—	475
Agnes H. Hastie, screw str.	—	,,	209	—	475
Pen C.W., paddle	—	,,	168	—	400

R. & W. Hawthorn, Leslie & Co., Ltd., Hebburn-on-Tyne.

Nubian, single-screw	—	British	—	6,450	—
Port Lincoln, single-screw	—	,,	—	7,460	—
t H.M.S. Christopher	—	,,	—	1,071	—
t H.M.S. Cockatrice	—	,,	—	1,071	—
Port Macquarie, single-screw	—	,,	—	7,460	—
Nitonian, single-screw	—	,,	—	6,450	—
Norrbotten, single-screw	—	Foreign	—	8,074	—
			Total	—	67,270

H.M.S.'s Christopher and Cockatrice, also the S.S. Norrbotten, have been engined and boilered at the St. Peter's Works. For other machinery, see Engine Section.

Hepple & Co., Ltd., South Shields.

Nos. 619 and 620, towing barges	—	Foreign	60ea	—	—
‡‡Nawab, screw tug	—	Colonial	26	—	150
d*Caxeas, paddle-steamer	—	Foreign	172	—	250
‡‡Nana, screw yacht	—	British	30	—	150
††Adventuress, screw yacht	—	,,	320	—	600
‡‡Anne, screw tug	—	,,	90	—	400

Engines by same Company.

WORK ON HAND—					
No. 627, screw yacht	—	British	—	—	—
No. 629, twin-screw tug	—	,,	—	—	—

William Dobson & Co., Newcastle-on-Tyne.

Elvet	—	British	1,289	1,289	1,200
Yarrowdale	—	,,	4,652	5,289	2,250
Pifjeld	—	Foreign	1,998	2,225	1,380
Kárpát	—	,,	4,291	5,248	2,050

The Northumberland Shipbuilding Co., Ltd., Howdon-on-Tyne.

Queen Louise	—	British	5,480	—	2,600
Ockley	—	,,	4,860	—	2,000
Freland	—	,,	4,750	—	2,000
Holmwood, Lynton Grange, Manchester Citizen, and Denby Grange	—	,,	4,800ea	—	2,000ea
Oaklands Grange and Roumton Grange	—	,,	5,100ea	—	2,150ea
Harmatris and Harflett	—	,,	6,420ea	—	3,000ea
Hollington	—	,,	4,800	—	2,000

† Triple. t Turbines. ‡‡ Compound Surface Condensing.
d* Diagonal Compound. †† Triple Surface Condensing.

Palmer's Shipbuilding & Iron Co., Ltd., Hebburn and Jarrow-on-Tyne.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
Queen Mary, battle-cruiser	Steel	British	27,000dis.	—	
Clan Macewen, cargo	,,	,,	5,140	—	4,000
City of Marseilles, pass.	,,	,,	8,200	—	4,800
Ebani, pass.	,,	,,	4,862	—	3,000
Eboe, pass.	,,	,,	4,862	—	3,000
Arca, oil	,,	,,	4,839	—	2,430
F. A. Tamplin, oil	,,	,,	3,999	—	1,900
					19,130
In addition to the above, the Company has manufactured water-tube boilers of					30,000
					49,130

John Readhead & Sons, Ltd., South Shields.

Trevanion	—	British	5,170	—	2,300
Exmoor	—	,,	4,763	—	2,300
Saba	—	,,	5,069	—	2,800
Yorkmoor and Treglisson	—	,,	5,157ea	—	2,300ea
Trevaylor	—	,,	5,156	—	2,300

The machinery and boilers by the same Company.

J. P. Rennoldson & Sons, South Shields.

Hartford, S.S.	—	British	407	—	475
Walter Gervase	—	,,	365	—	415
Wearsider	—	,,	596	—	725
P. & O. Tender	—	,,	200	—	280
Abeille No. 4, screw tug	—	French	209	—	696
Oscar D. Bennett, screw-tug	—	British	175	—	465
No. 281, Screw tug	—	Greece	122	—	385
Joseph Constantine, screw-ting	—	British	153	—	645

Engines for first three by the same Company.

Swan, Hunter & Wigham Richardson, Ltd., Wallsend and Walker-on-Tyne.

Bittern	—	British	2,088	—	(a)1,400
Birma	—	Foreign	5,186	—	2,500
City of Bristol	—	British	7,980	—	3,850
Cordelia	—	,,	6,565	—	2,850
Dimboola	—	Colonial	4,542	—	(a)3,300
Dock for submarines, lifting tonnage 1,500	—	British	—	—	—
Emil L. Boas, twin-screw	—	Foreign	6,075	—	5,500
Karl Schurz, twin-screw	—	,,	6,035	—	5,500
Lagos dock, lifting tonnage 5,100	—	Colonial	—	—	—
Medway dock, lifting tonnage 33,000	—	British	—	—	—
Mitra	—	,,	5,754	—	2,800
Natica	—	,,	5,750	—	2,800
Ranella	—	,,	5,753	—	2,800
†† Reina Victoria-Eugenia	—	Foreign	10,840	—	(a)11,000
San Dunstano and San Eduardo	—	British	6,409ea	—	(a)2,800ea
Shark, Sparrowhawk and Spitfire, twin-screws	—	,, dis.	1,090ea	—	—
Vanellus	—	,,	2,088	—	(a)1,400
Waterford, twin-screw	—	,,	1,808	—	(a)3,300
			126,152	—	26,000

The engines and boilers for vessels marked (a) and also 16 other boilers were built at the Neptune Engine Works, Walker.

The Tyne Iron Shipbuilding Co., Ltd., Willington Quay-on-Tyne.

† Florentia, screw, cargo	Steel	British	3,688	4,100	1,850
† Russian Prince, oil tanker, screw	,,	,,	4,158	4,350	2,050
† Thessalia, screw, cargo	,,	,,	3,690	4,100	1,850

WORK ON HAND—

Sufficient work is in hand for nearly the whole of 1913.

Wood, Skinner & Co., Ltd., Newcastle-on-Tyne.

† Salonica	Steel	Foreign	2,694	—	1,670
† Betty	,,	,,	2,102	—	1,320
† San Jose	,,	,,	1,587	—	1,825
† Fulgens	,,	British	2,512	—	1,635
† Combe	,,	,,	2,050	—	1,465

THE WEAR.

S. P. Austin & Sons, Ltd., Sunderland.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
† Melton, well-deck	Steel	British	1,854	—	1,370
† Rondo, well-deck	,,	,,	1,906	—	1,200
† Hillingdon, well-deck	,,	,,	1,926	—	1,200
† Cove, single-deck	,,	,,	2,734	—	1,600

Bartram & Sons, Ltd., Sunderland.

** Torridge, steam	Steel	British	5,035	5,470	2,875
** Orpheus, steam	,,	,,	4,392	5,295	2,425
** Highbury, steam	,,	,,	4,830	5,229	2,410
** Cheniston, steam	,,	,,	4,818	5,246	2,410
** Adenwen, steam	,,	,,	3,778	4,868	2,100

a Quadruple. †† Triple Expansion and Turbines.
† Triple ** Tri-Compound.

John Blumer & Co., Sunderland.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
Wyvisbrook	Steel	British	3,158	3,546	1,700
Wearwood	,,	,,	3,221	3,665	1,660
Uskmoor	,,	,,	3,189	3,550	1,750
Portloe	,,	,,	3,187	3,548	1,840
Salamanca	,,	,,	3,218	3,580	1,750

John Crown & Sons, Ltd., Sunderland.

Newtownards, steam	Steel	British	837	—	N.H.P. 138
Sheba, steam	,,	,,	2,267	—	N.H.P. 222
Wear, steam	,,	,,	1,163	—	148

William Doxford & Sons, Ltd., Sunderland.

Stiklestad, steam	Steel	Foreign	—	7,091	2,650
Corsinia, steam	,,	,,	—	4,822	1,850
Herman Sauber, steam	,,	,,	—	3,030	1,300
Dinorah, steam	,,	,,	—	5,013	1,900
Standish Hall, steam	,,	British	—	4,337	1,400
Nefeli, steam	,,	Foreign	—	4,780	1,800
Crios, steam	,,	,,	—	5,060	1,900
Athamas, steam	,,	,,	—	4,779	1,800
Bridgeport, steam	,,	British	—	6,821	3,200
Cardiff Hall, steam	,,	,,	—	4,375	1,400
Glace Bay, steam	,,	,,	—	6,821	3,200
Portrush, coal elevator	,,	,,	—	742	—
Maria Raeich, steam	Steel	Foreign	—	5,052	1,850
Noya, steam	,,	British	—	4,660	2,000
Herakles, steam	,,	Foreign	—	5,368	2,050
Grena, steam	,,	,,	—	7,201	2,650
Cairnross, steam	,,	British	—	5,310	1,900
Strinda, steam	,,	Foreign	—	7,201	2,650

All engined by same Company.

10 Oil cylinders for S.S. Escalona.

Osbourne, Graham & Co., Ltd., Sunderland.

† Marcelle, steam	Steel	Foreign	1,691	1,716	1,140
† Katoa	—	Colonial	2,484	2,661	2,000
† Nervion, "Monitor" design	—	Foreign	1,921	2,146	1,200
† Reime, "Monitor" design	—	,,	1,920	2,145	1,200
† Denise and Genevieve	—	,,	1,696ea	1,721ea	1,140ea

WORK ON HAND—

2 more "Monitors" now building, etc.

Sir James Laing & Sons, Ltd., Sunderland.

Turbo	—	British	4,781	4,891	2,350
Eastwell	—	,,	5,015	5,572	3,500
Laertis	—	Foreign	3,913	4,798	1,700
Bowes Castle	—	British	4,650	5,287	2,350
Lucellum	—	,,	5,179	5,252	2,400

Wm. Pickersgill & Sons, Ltd., Sunderland.

Eskbridge	—	British	3,409	—	1,500
Helmsmuir	—	,,	4,200	—	2,450
Throstle	—	,,	2,293	—	1,350
Maston	—	,,	3,881	—	2,000

John Priestman & Co., Sunderland.

Portuguese Prince	—	British	—	6,308	3,250
Haworth	—	,,	—	4,397	1,950
Time	—	Colonial	—	3,414	2,600
Hannington Court	—	British	—	5,726	2,650
Uskside	—	,,	—	2,385	1,310

Short Bros., Ltd., Sunderland.

Anglo-Californian	—	British	7,333	—	3,600
Hindustan	—	,,	4,087	—	1,900
Hesleyside	—	,,	4,523	—	2,170
Daghestan	—	,,	4,086	—	1,900
Anglo-Egyptian	—	,,	7,378	—	3,600
Escalona	—	,,	5,321	—	2,100

Sunderland Shipbuilding Co., Ltd., Sunderland.

Astree	Steel	Caen	1,111	—	900
Prosper III.	,,	Drammen	4,674	—	2,045
Easton	,,	Sunderland	2,022	—	935
Siljestad	,,	Christiania	4,588	—	2,045
Petra	,,	Tonsberg	2,303	—	1,395
Gerald Turnbull	,,	Cardiff	3,438	—	1,720
Harpathian	,,	London	5,940	—	3,000

Joseph L. Thompson & Sons, Ltd., Sunderland.

Southern	Steel	British	4,769	6,380	2,730
Chincha	,,	,,	6,395	6,657	2,880
Curaca	,,	,,	6,386	6,647	2,880
Shakespeare	,,	,,	3,466	4,018	1,800
Finchley	,,	,,	4,126	5,068	2,100
Larchmore	,,	,,	4,355	5,157	2,600
Murjek	,,	Foreign	4,126	4,904	2,100
Elvaston	,,	British	4,126	4,904	2,100

Robert Thompson & Sons, Ltd., Sunderland.

** Winlaton, screw	Steel	British	3,263	3,665	1,850
** Zvir, screw	,,	Foreign	3,549	4,402	1,925
** Steinstad, screw	,,	,,	2,477	2,729	1,375
** Fotis, screw	,,	,,	3,326	4,319	1,985
** Scarsdale, screw	,,	British	3,682	4,175	1,960
** Socoa, screw	,,	Foreign	2,724	3,084	1,590

† Triple ** Tri-Compound.

TEES & HARTLEPOOLS.

Craig, Taylor & Co., Ltd., Stockton-on-Tees.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu erect	I.H.P.
Lord Cr[illegible] single-screw ..		Liverpool	5,248	—	2,550
Luise H[illegible] single-screw ..		Lubeck	4,500	—	2,260
H[illegible]ar Pass[illegible] single-screw		Hamburg	4,500	—	2,280
Hornfels, single-screw ..		Lubeck	4,500	—	2,260
Dalgarrel, single-screw ..	—	Sunderland	5,080	—	2,250
Swindon, single-screw ..	—	London	6,989	—	2,850

Sir Raylton Dixon & Co., Ltd., Middlesbrough-on-Tees.

Karl Schroers, steam ..	Steel	Foreign	1,873	2,100	1,100
Normanton, steam ..	,,	British	3,862	4,920	2,000
Travestine	,,	,,	1,781	2,020	850
Warley Pickering, steam	,,	,,	4,196	4,800	2,250
Fauvette, steam	,,	,,	2,644	3,230	3,200
Fullerton, steam	,,	,,	2,811	3,630	1,800
Acth, steam	,,	,,	3,600	4,850	2,500
Kalix, steam	,,	Foreign	2,700	3,550	1,760

Last two vessels piteat Cantilever framed top-side tank steamers.

W. Gray & Co., Ltd., West Hartlepool.

Thorpwood ..	British	3,682	—	1,400
Oakfield ..	,,	4,998	—	2,030
Arabistan ..	,,	5,757	—	3,710
Quebra ..	,,	5,493	—	2,180
Marguerite ..	Foreign	3,721	—	1,670
Shahristan ..	British	5,766	—	3,710
Pendolver ..	,,	4,154	—	1,800
Flixton ..	,,	5,346	—	2,280
Burma	Foreign	5,601	—	3,030
Cranfield ..	British	3,236	—	1,390
Harden ..	,,	1,708	—	1,170
Arakan ..	Foreign	6,167	—	3,910
Boscastle ..	British	2,706	—	1,440
Arachne ..	,,	4,380	—	1,800
Mokta	,,	4,186	—	1,750
Baharistan ..	,,	4,880	—	2,030
Boeton ..	Foreign	6,365	—	4,000
Tabarka ..	British	4,186	—	1,750
Cyrena	,,	2,225	—	1,460
Batjan	Foreign	6,365	—	4,000

Wm. Harkess & Son, Ltd., Middlesbrough.

Leon Y. Castillo ..	—	Las Palmas	871	—	950
La Palma	—	Santa Cruz	871	—	950
Trentwood	—	British	791	—	800
o T.S.S. Calgary ..	—	,,	1,639	—	—
4 Hopper barges ..	—	,,	242ea	—	—
John Shaw	—	,,	1,490	—	1,000

WORK ON HAND—

3 new vessels, each for the Ellerman Lines, Ltd., Brazilian trade and Liverpool owners.

Irvine's Shipbuilding & Dry Docks Co., Ltd.

Start Point, screw steamer	—	British	5,200	—	2,350
Black Head, screw steamer	—	,,	2,250	—	1,000
New Londoner, pass. and cargo	—	,,	1,800	—	2,300
La Correntina, twin-screw steamer, meat and pass..	—	,,	10,250	—	7,000
West Point, screw steamer	—	,,	5,200	—	2,350
Marmion, screw steamer ..	—	,,	5,260	—	2,000
Eloby, pass. and cargo ..	—	,,	6,250	—	3,000
Newfield, screw steamer ..	—	,,	4,450	—	1,800
Digby, pass. and cargo ..	—	,,	5,500	—	3,800
S.S. No. 521, pass. and cargo	—	,,	6,250	—	3,000

Richardson, Duck & Co., Ltd., Stockton-on-Tees.

Nantwen, steamer	—	British	—	5,317	2,300
Buranda, steamer	—	,,	—	4,056	1,950
Novington, steamer	—	,,	—	4,341	1,950
Eddystone, steamer ..	—	,,	—	5,312	2,350
Kenmore, steamer	—	,,	—	4,378	2,350
Burbridge, steamer	—	,,	—	4,452	1,950
Tavian, steamer	—	,,	—	5,894	2,450
Shahristan, steamer	—	,,	—	5,638	3,200

5th and 7th vessels Isherwood system of construction.

Ropner & Sons, Ltd., Stockton-on-Tees.

† Hopper barge No. 23.. ..	Steel	British	1,126	—	1,500
† Atlantic City	,,	,,	5,265	—	2,400
† Rockpool	,,	,,	5,407	—	2,280
† Fishpool	,,	,,	5,436	—	2,280
† Twickenham	,,	,,	5,330	—	2,600
† Nurtureton	,,	,,	6,059	—	2,680
† Willerby	,,	,,	4,014	—	1,930
† Sturton	,,	,,	5,335	—	2,390
† Clan Macbride	,,	,,	5,296	—	2,360
† Salmonpool	,,	,,	5,858	—	2,650

Smith's Dock Co., Ltd., Middlesbrough-on-Tees.

30 vessels	—	—	total 10,029	—	—

† Triple. *dm* Diesel Motor. *o* Oil.

HUMBER.

Cochrane & Sons, Ltd., Selby.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
Davara, trawler		British	291	-	550
Merista, trawler		,,	291	-	520
Garola, trawler		,,	248	-	475
Settsu and Hondo, trawlers		,,	230ea	—	425ea
Exmouth, trawler		,,	236	—	425
Hilda and Ernest, Ploughboy and Eager, drifters ..	—	,,	102ea	—	220ea
Cyelse, trawler	—	,,	236	—	425
Balfour and Bonar Law, trawlers	—	,,	285ea	—	475ea
Germano 3° pilchard fisher	—	Foreign	47	—	130
Immanuel, trawler	—	,,	217	—	430
Silver Line, drifter	—	British	94	—	190
Andrew Marvel and Lord Lister, trawlers	—	,,	285ea	—	475ea
Balsense, pilchard fisher ..	—	Foreign	47	—	130
Yucca, trawler	—	British	197	—	400
Ingolfur Arnarson, trawler	—	Foreign	315	—	520
G. E. Foster and Andrew Kelly, trawlers	—	British	228ea	—	440ea
Lord Carrington, trawler ..	—	,,	285	—	475
Isa, trawler	—	Foreign	217	—	430
Velia, trawler	—	British	285	—	475
Ledoryz, tug	—	Foreign	86	—	320
Luneda, trawler	—	British	288	—	500
Tigir, coaster	—	,,	243	—	300
Caulonia, trawler	—	,,	296	—	500
St. Leonard, trawler	—	,,	295	—	500
Neptunian, trawler	—	,,	300	—	550
Fentonian, trawler	—	,,	224	—	420
Dogger Bank, carrier	—	,,	266	—	600
Diamond and Sapphire, trawlers	—	,,	290ea	—	550ea
† Trawler	—	,,	280	—	500

All the above are steam ships. Engines by same Company.

Cook, Welton & Gemmell, Ltd., Beverley.

† Relevo, steam trawler ..	Steel	British	176	—	375
† Birch, steam trawler ..	,,	,,	215	—	425
† Quercia and Sheldon, steam trawlers	,,	,,	287ea	—	540ea
† Ninus, steam trawler ..	,,	,,	292	—	525
† Edwardian, Raetia, and Solon, steam trawlers ..	,,	,,	295ea	—	540ea
† Pavlova and Ravond'or, steam trawlers	,,	,,	342ea	—	550ea
† Remexo, steam trawler ..	,,	,,	230	—	450
† Rebono, steam trawler ..	,,	,,	175	—	400
† Monimia, steam trawler ..	,,	,,	342	—	550
† Good Luck, steam trawler	,,	,,	294	—	530
† Tartan, steam trawler ..	,,	,,	201	—	400
† Rowsley and Suncloud, steam trawlers	,,	,,	213ea	—	420ea
† Sialkot, steam trawler ..	,,	,,	308	—	520
† Imperia and Desiree, steam trawlers	,,	,,	213ea	—	420ea
† Cardinal, steam trawler ..	,,	,,	320	—	550
† James Carruthers, steam trawler	,,	,,	232	—	425
† Silicia and Strephon, steam trawlers	,,	,,	250ea	—	440ea
† Iranian, steam trawler ..	,,	,,	201	—	400
† Worsley, steam trawler ..	,,	,,	308	—	520
† Warland, steam trawler ..	,,	,,	213	—	420

Engines by same Company.

Earle's Shipbuilding & Engineering Co., Ltd., Hull.

Tilburian, dredger	—	British	608	—	1,250
Brocklesby	—	,,	508	—	1,070
Killingholme	—	,,	508	—	1,070
Sorrento	—	,,	2,967	—	1,500
Cattaro	—	,,	2,968	—	1,500
Nos. 63 and 64, Hoppers..	—	,,	486ea	—	350ea
Tasman	—	Foreign	5,400	—	3,600
Torcello	—	British	2,968	—	1,500
Withernsea and Portsea ..	—	,,	3,820ea	—	1,600ea
Albano	—	,,	1,650	—	1,100
					16,490
I.H.P. of Machinery for renewals and ships built elsewhere					17,770
				I.H.P. Total	34,260

The Goole Shipbuilding and Repairing Co., Ltd., and Associated Firm, The Dundee Shipbuilding Co., Ltd.

Varro, screw steamer.. ..	Steel	British	196	—	650
Teesborough, screw steamer	,,	,,	308	—	400
Teign I., screw steamer ..	,,	,,	531	—	450
Virgo and Warbler, screw steamers	,,	,,	192ea	—	300ea
Channel Queen, screw pass. steamer	,,	,,	670	—	650
Tummel, screw steamer ..	,,	,,	531	—	450
Ferriby, screw steamer ..	,,	,,	335	—	570
Sagona, screw steamer ..	,,	,,	808	—	850
Libra and Corona, screw steamers	,,	,,	211ea	—	400ea
Panama, screw pass. steamer	,,	Foreign	946	—	750
Malta and Bermudas, schooners	,,	,,	654ea	—	—
Wanstead, screw steamer ..	,,	British	767	—	750
12 Barges	—	Foreign	906	—	—

† Triple.

Henry Scarr, Hessle.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
‡‡A.C.E.S. No. 3 Steam barge	Steel	British	200	—	90
/R.G. & Co., steam tug ..	,,	Foreign	40	—	90
/St. George, steam barge ..	,,	British	30	—	20
Zany, towing barge	,,	,,	150	—	—
Only Sou, towing barge ..	,,	,,	220	—	—
Badger, towing barge ..	,,	,,	30	—	—
Whint, towing barge	,,	,,	150	—	—

Joseph Scarr & Son, Beverley.

Towing lighter	—	British	220	—	—
4 Keels	—	,, total	588	—	—
Sloop	—	,,	140	—	—
2 Canal barges	—	,,	100ea	—	—

W. H. Warren, Esq., New Holland, Lincs.

Gambrinus, steam	Steel	British	120	—	—
Nelson and Blake, sailers ..	,,	,,	80ea	—	—
2 Store barges	,,	British Gov.	150ea	—	—
5 Store barges	,,	,,	30ea	—	—
Baltic	,,	British	229	—	—
Tug (no name), steam ..	,,	,,	75	—	—
Grab dredger	,,	,,	100	—	—
Grab dredger	,,	Italy	80	—	—
WORK ON HAND—					
3 Hopper barges..	—	—	—	—	—
1 Motor barge	—	—	—	—	—
5 Barges	—	—	—	—	—

THAMES.

Beaching Bros., Ltd., Great Yarmouth.

8 Steam drifters	Wood	—	100ea	—	—

John Chambers, Lowestoft.

Mary Evelyn, steam drifter	Wood	British	90	—	200
m Avance, drifter	,,	Foreign	90	—	138B.H.P
* Redwald, steam drifter ..	,,	British	80	—	150
* Constant Friend, steam drifter	,,	,,	92	—	175
* Sweet Pea, steam drifter ..	,,	,,	72	—	130
† Scadaun, steam drifter ..	,,	,,	107	—	225
† Ocean Retriever, steam drifter	,,	,,	94	—	200
* Helpmate, steam drifter ..	,,	,,	75	—	130
* Rosemma, steam drifter ..	,,	,,	92	—	175
* New Spray, steam drifter ..	,,	,,	69	—	130
* East Holme, steam drifter	,,	,,	74	—	130
* Lord Carnarvon, steam drifter	,,	,,	80	—	130
* Fraternal, and Restart, steam drifters	,,	,,	79ea	—	160ea
Notre Dame de la Mer, sailing drifter	,,	Foreign	94	—	—
* Hastings Castle, steam drifter	,,	British	73	—	130
† Victor and Mary, steam drifter	,,	,,	81	—	160
* Steam drifter not named yet	,,	,,	92	—	175
† Steam drifter ,, ,, ,,	,,	,,	92	—	200
Golden Lily, sailing trawler	,,	,,	57	—	—
WORK ON HAND—					
There is a large amount of work on hand for next year.					

Crabtree & Co., Great Yarmouth.

Fred Salmon, drifter	Steel	British	102	—	225
Boy Daniel, drifter	,,	,,	84	—	180
St. Hubert and Montaigne, drifters	,,	Foreign	182ea	—	325ea
Gloire de Marie, trawler ..	,,	,,	222	—	420
Inez, trawler	,,	,,	290	—	500
WORK ON HAND—					
5 Steel vessels in hands.					

Edwards & Co., Ltd., Millwall.

Jasminum, Kingcup, Lupin, Mimulus, Nasturtium, Whitlavia and Xinga, lighters	Steel	British	100ea	—	—
2 Hopper barges	,,	,,	45ea	—	—
Dumb Barge	,,	Foreign	6	—	—
3 Motor fireboats	,,	,,	15ea	—	65B.H.P.ea
Veloz, motor launch	,,	,,	14	—	15B.H.P.
Fraly, motor auxiliary ketch	,,	British	108	—	55B.H.P.
3 Barges	,,	,,	70ea	—	90B.H.P.ea
Dumb Barge	,,	Foreign	52	—	—
1 Launch	,,	,,	—	—	—
1 Launch and 1 tug (Olive)	,,	British	37	—	146I.H.P.
Lighter	,,	,,	26	—	—
Motor Barge	,,	,,	23	—	20B.H.P.
WORK ON HAND—					
9 Lighters and 1 stern wheeler.					

Fellows & Co., Ltd., Southtown Dry Docks, Great Yarmouth.

Water-Witch, fireboat ..	Steel	—	—	—	—
Frons Olival, steam drifter	,,	British	98	—	—
Girl Marjorie, steam drifter	Wood	,,	92	—	—
Girl Winifred, steam drifter	,,	,,	90	—	—
† Covent Garden, steam drifter	,,	,,	84	—	—
Evelyn Joyce, steam drifter	,,	,,	93	—	—
Cenwulf, steam drifter ..	,,	,,	93	—	—

‡‡ Compound Surface Condensing. † Triple.
/ Compound Non-Condensing. *m* Motor. * Compound.

Rennie Forrestt Shipbuilding, Engineering and Dry Dock Co., Ltd., Wivenhoe, Essex.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
Stern Wheel Steamer ..	—	—	200	—	600
Fire and Salvage steamer, 110 ft.	—	—	350	—	500
Fast steam launch, 70 ft. ..	—	—	35	—	180
Motor tank vessel	—	—	300	—	100
Gas boat	—	—	10	—	—
Tank steamer, twin-screw, 120 ft.	—	—	300	—	230
Dahabieh	—	—	15	—	—
3 O cean going tugs	—	—	120ea	—	200ea
2 shallow draught lighters	—	—	300ea	—	—
Tunnel stern passenger launch, 80 ft.	—	—	70	—	140
Passenger launch	—	—	40	—	50
6 Lighters, 87 ft. each ..	—	—	170ea	—	—
2 Lighters, 100 ft. each ..	—	—	400ea	—	—
Twin-screw passenger steamer, 120 ft.	—	—	97	—	190
Training vessel auxiliary, 3-masted schooner	—	—	750	—	250
Grab dredger	—	—	45	—	—
Motor stern wheeler	—	—	17	—	40
Passenger launch	—	—	40	—	40
4 Twin-screw shallow draught tugs	—	—	80ea	—	220ea
Lighter	—	—	300	—	—
Lighter, 100 ft.	—	—	400	—	—
Stern wheel steamer, 85 ft.	—	—	35	—	100

In the boat-building department there have been constructed two 52-ft. Admiralty Pinnaces, two 45-ft. Admirals' barges, also 12 ships' lifeboats, one yacht's motor dinghy, one high-speed launch, five patent lifeboats and one rowing boat.

WORK ON HAND—					
Harbour screw tug	—	—	70	—	160
High-speed twin-screw launch	—	—	70	—	230
4 harbour tugs	—	—	50ea	—	150ea
Light-house tender	—	—	900	—	750
Triple-screw motor yacht ..	—	—	200	—	300
Lighter, 100 ft.	—	—	400	—	—
Twin-screw motor yacht ..	—	—	70	—	200
2 Harbour tugs	—	—	80ea	—	380ea
45 patent lifeboats, 1 motor launch and 6 ships' boats.					

A. W. Robertson & Co., Canning Town.

Stern-wheel steamer	—	Foreign	48	—	150
Coal whip barge and machinery	—	,,	25	—	—
Grab dredger	—	British	50	—	—
20 Steel lighters	—	,,	4,100	—	—

H. Shrubsall, Esq., E. Greenwich.

Vicunia..	Wood	British	94	—	—

ENGLISH CHANNEL.

Camper & Nicholson, Ltd., Gosport.

m Vashti and Gelyce	Wood	—	8ea	—	60ea
Istria	,,	British	31	—	—
m Xarifa	Compo	,,	181	—	125
WORK ON HAND—					
dm Atair	Steel	—	100	—	300
No. 208, Sail	Wood	—	32	—	—
No. 209, Sail	,,	—	32	—	—
No. 207, Sail	Steel	—	190	—	—
m No. 210	,,	—	280	—	700
La Cigale (lengthened 21 ft. amidships. First composite yacht thus altered) ..	Compo	British	160	—	120

Cox & Co. (Engineers), Ltd., Falmouth.

S.S. Tug	—	—	57½	—	200
War Department S. Steamer	—	—	80	—	250
S.S. Pass. Vessel..	—	—	71½	—	250
S.S. Tug	—	—	47½	—	226
S.S. Tug	—	—	48	—	210
Engines by same firm.					

J. G. Fay & Co., Ltd., Southampton.

Carib, cruising yawl yacht..	Wood	British	37	—	—
Star II., 7 met. racing yacht	,,	Foreign	6	—	—

P. K. Harris & Son, Appledore.

P. T. Harris, schooner ..	Wood	British	131	—	—

Philip & Son, Ltd., Dartmouth.

3 Admiralty cutters, steam	Wood	—	10ea	—	30ea
3 Admiralty launches, steam	,,	—	35ea	—	150ea
Screw tug, steam	Steel	—	25	—	80
Sedulous, drifter, steam ..	,,	British	110	—	300
Launch, steam	Wood	Foreign	10	—	30
Aberfoyle, pass. steamer, steam	Steel	British	95	—	250
Arary, tug and salvage boat, steam	,,	Foreign	85	—	300
WORK ON HAND—					
Launch, steam	Wood	Foreign	3	—	8
Screw tug, steam	Steel	British	75	—	350
Four launches, steam ..	,,	Foreign	50ea	—	240ea
Yacht, sail, aux...	Wood	British	8	—	12

m Motor. *dm* Diesel Motor.

Simpson, Strickland & Co., Ltd., Dartmouth.

Name of Vessel	Built of	Owners	G.T. Regis.	G.T. incln. erect.	I.H.P.
Launch	Wood	—	3	—	10
‡‡Launch	—	Foreign	6	—	18
a Launch	—	—	2	—	14
* Launch	Steel	Foreign	6	—	25
Boat	Wood	—	1	—	—
Tug	Compo	—	6.4	—	130
‡‡Launch	Steel	Foreign	7	—	30
a Launch	Wood	—	1	—	25
‡‡Launch	—	—	5	—	28
a Launch	—	—	1	—	10
* Launch	Steel	Foreign	16	—	80
m Launch	Wood	British	5	—	—
Motor launch	,,	,,	13	—	76
m Spanker, launch	,,	,,	11	—	35
Boat	,,	,,	1	—	—
Launch	—	Foreign	4	—	—
Launch	—	British	3	—	26
4 Launches	—	—	4ea	—	26ea
Boat	—	—	0.60	—	—
Sylphe launch	—	Foreign	15	—	100
Steel lighter	—	—	16	—	—

18 Vessels engined by the same Company.

WORK ON HAND—

Launch	Steel	—	11	—	—
Lighter	—	Foreign	5	—	—
Launch	Wood	—	4	—	19
‡‡Launch	Steel	Foreign	26	—	100
Lifeboat	Wood	—	1	—	—
Lifeboat	,,	—	1	—	—
Boat	—	—	0.30	—	—

Machinery and Boilers supplied to other builders, 1,099 tons.

Geo. & Thomas Smith, Ltd., Rye, Sussex.

Energie sail. trawler	Wood	British	59	—	—
Martinet, sail, coast. barge	,,	,,	126	—	—

WORK ON HAND—
One trawler, twin to "Energie."

John I. Thornycroft & Co., Ltd., Southampton.

H.M.S. Hardy (torpedo-boat destroyer)	Steel	British	900	—	23,000
d H.M. Paddle Tug Sturdy	,,	,,	750	—	1,250
d H.M. Paddle Tug Strenuous	,,	,,	750	—	1,250
dm Motor yacht	,,	Foreign	80	—	400
2 Ferry steamers	,,	Colonial	135ea	—	330ea
m Motor passenger vessel	,,	,,	70	—	200
Barge	,,	,,	100	—	—
m 2 Armoured motor patrol launches	Wood	Foreign	30ea	—	140ea
m Motor launches (various)	—	—	120	—	310

Internal Combustion Engines supplied by Thornycrofts for other hulls 6,000

N.B.—The above totals (vessels launched) are unusually small in comparison with the work in hand, which totals over 10,000 tons and 190,000 I.H.P. for particulars, see Work Completed during the Year Section).

J. Samuel White & Co., Ltd., Cowes, I. of W.

Torpedo-boat destroyers, shallow draught vessels for special service, special steam-boats for warships	Brit. & For. Govs. tot. 4,476	— tot. 56,476	

WORK ON HAND—

——	Brit. & For. Govs. tot. 6,839	— tot. 104,901	

Wm. White & Sons, Cowes, I. of W.

2 Steam launches	Wood	British	20ea	—	65ea

Engines by same establishment.

Willoughby Bros., Ltd., Plymouth.

WORK ON HAND—

Motor ketch	—	British	—	—	45 B.H.P.
Hopper barge for refuse	—	—	165	—	—

Are very busy on repairs.

BRISTOL CHANNEL.

Edward Finch & Co., Ltd., Chepstow.

1 150-ton Lighter, 80 ft. by 20 ft. by 7 ft.
2 Canal motor barges, 60 ft. by 12 ft. 6 in. by 5 ft. 6 in., to carry 45 tons each.
1 Barge, 40 ft. by 19 ft. by 5 ft., to carry a crane.
2 75-ton Lighters, 60 ft. by 18 ft. by 6 ft. 6 in.
2 75-ton Lighters, 60 ft. by 18 ft. by 6 ft. 6 in.
2 150-ton Lighters, 80 ft. by 22 ft. by 6 ft. 6 in.
1 Pontoon, 66 ft. by 16 ft. 6 in. by 6 ft. 9 in.
3 150-ton Lighters, 80 ft. by 22 ft. by 6 ft. 6 in.
2 250-ton Lighters, 100 ft. by 21 ft. by 8 ft.
2 Mooring lighters, 95 ft. by 26 ft. 6 in. by 10 ft. 6 in.

a Quadruple. ‡‡ Compound Surface Condensing. * Compound.
m Motor. † Triple. td Turbines and Diesels.
d Diagonal Compound. dm Diesel Motor.

C. H. Walker & Co., Ltd., Sudbrook, nr. Chepstow, Mon.

Name of Vessel	Built of	Owners.	G.T. Regis.	G.T. incln. erect.	I.H.P.
Cargo steamer	Steel	Foreign	613	—	110
Crane pontoon, towing	,,	,,	275	—	—
Lighter, towing	,,	British	47	—	—
Lighter, towing	,,	Pt. Victoria	23	—	—
10 Skip barges, towing	,,	Foreign	1,000	—	—
Steam tug	,,	,,	48	—	150
5 Admiralty store lighters, towing	,,	British	65	—	—

MERSEY.

Isaac J. Abdela & Mitchell, Ltd., Queen's Ferry.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. incln. erect.	I.H.P.
S.W.S. (in progress)					
2 Lighters, S'il	Steel	Argentine	250ea	—	—
Hopper, S'il	,,	British	300	—	—
m 2 Lighters	Gal. steel	Brazil	70ea	—	50ea
Manuel Thomaz, S.W.S.	,,	Theresina	—	—	300
Barbel & Bittercling, S'il	Steel	British	200ea	—	—
Broughton, S.W.S.	Gal. steel	Forcardos	—	—	150
m Worcester & Birmingham	Iron	British	—	—	50ea
Water-boat	Steel	Maranham	—	—	—
Reconstruction job, paddle-steamer "Grappler."					

WORK ON HAND—

6 Lighters	—	—	300ea	—	—
1 Twin-screw motor lighter	—	—	150	—	—
1 30-ft. Teak steam launch	—	—	—	—	—

8 Dinghies and reconstruction job of paddle-steamer "Rover," and a number of large tanks.

Cammell, Laird & Co., Ltd., Birkenhead and Tranmere.

t Melbourne, cruiser	Steel	British	Not available.		
t Audacious, battleship	,,	,,	,,	,,	
t Grenmore, cross-Channel pass. and cargo	,,	,,	1,488	—	7,000
t Westbourne (hull only), tug	,,	,,	185	—	—
Kristianiafjord, pass. and cargo, twin-screw recipr.	,,	Foreign	11,400	—	8,500
Dart, chilled meat barge, twin-screw reciprocating	,,	,,	1,103	—	850
Floating dock, lifting power, tons, 33,000	,,	,,	—	—	—
Iron Duke, battleship (machinery only)	—	,,	Not available.		
Seabra, stern-wheeler (hull only)	,,	Foreign	90	—	—
Luana, launch	—	,,	48	—	—
34 Barges, etc.	—	British total	828	—	—

Isaac Pimblott & Sons, Ltd., Northwich.

4 Lighters	Steel	Foreign total	65est	—	
* 4 Launches	,,	,, total	24	—	22ea
2 Lighters	,,	,,	60ea	—	—
T.S. Motor barge	,,	,,	30	—	—
T.S. Steam tug	,,	,,	57	—	180
3 Lighters	,,	,,	20	—	—
Launch	,,	,,	7	—	—
Motor launch	,,	,,	6	—	—
8 Lighters	,,	,, total	357	—	—

Wm. Thomas & Sons, Amlwch, N. Wales.

Morfydd, hospital ship	Compo	—	—	—	—

Vickers, Ltd., Naval Construction Works, Barrow-in-Furness.

Sheerness yard craft No. 96 (water tank and salvage vessel)	—	British Gov.	—	—	—
H.I.J.M.S. Kongo	—	Japanese Gov.	—	—	—
Guarany, tug	—	Brazilian Gov.	—	—	—
Floating ship dry dock, Duke of Connaught	—	Canadian	—	—	—
Various small vessels	—	—	—	—	—
Total Horse-power constructed					136,750
Total tonnage launched					52,860

m Motor. t Turbines.
* Compound.

R. Williamson & Sons, Workington.

Name of Vessel	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
† McElwain, single-screw ..	—	British	810	—	—
† Aysgarth Force, single-screw	—	,,	582	—	—
† Boro, single-screw	—	,,	815	—	—
† Volturnus, single-screw ..	—	,,	615	—	—

W. J. Yarwood & Sons, Castle Dock, Northwich, Cheshire.

Motor launch ..	Wood	British	20	—	35
‡‡2 Screw steamers	Steel	,,	137ea	—	220ea
/Steam launch	,,	Foreign	30	—	30
* 1 pair 50 feet Lock Gates..	—	—	—	—	—
Motor launch	Wood	British	—	—	60
‡‡Steamer	,,	,,	45	—	50
3 Barges	Compo	,,	75ea	—	—
/Steam launch	Steel	Foreign	13	—	30
2 Barges	,,	British	500ea	—	—
‡‡Screw steamer	,,	,,	150	—	200
‡‡Screw steamer	,,	,,	137	—	100

All engines by same firm except the motors.

WORK ON HAND—					
Motor barge	Steel	British	76	—	80
Pontoon and erection ..	—	,,	—	42	
Barge	Compo	,,	45	—	
‡‡2 Screw steamers	Steel	,,	190ea	—	220ea
2 Barges	,,	,,	56ea	—	—
‡‡Screw steamer	,,	,,	137	—	110

Engines to be built by same firm except the motors.

THE RIBBLE.

Lytham Shipbuilding and Engineering Co., Lytham, Lancs.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
‡‡Leverville, stern-wheel stmr.	Steel	—	350app.	—	app.430
‡‡Duc-de-Brabant, stern-wheel steamer	,,	—	415app.	—	app.570
‡‡Mungo Park, stern-wheel steamer	,,	British	264	—	380
/Faro, stern-wheel steamer ..	,,	—	70app.	—	app.100
2 Cargo lighters	,,	—	ea130app.	—	—
1 Cargo lighter	,,		60app.	—	—
/Ullsgarth, single-screw tug	,,	British	45	—	275
Cargo lighter	,,	—	60app.	—	—
d*Bareo-de-Urussuhy, side-paddle steamer	,,	Foreign	193	—	390
‡‡Christino Cruz, twin-screw steamer	,,	,,	170app.	—	320
‡‡Berwind, single-screw tug ..	,,	,,	90app.	—	505
/Duffo twin-screw launch ..	,,	—	40app.	—	100
‡‡Kampé and Kelbi, stern-wheel steamers	,,	—	120ea	—	205ea

Engines by same Company.

WORK ON HAND					
‡‡Single-screw canal tug ..	Steel	—	20app.	—	app. 60
3 Cargo lighters	,,	—	ea60 app.	—	—
Stern-wheel steamer	,,	British	650app.	—	app.650
‡‡Single-screw tug	,,	,,	90app.	—	505
6 Towing lighters	,,	,,	170ea	—	—

ROYAL DOCKYARDS.

H.M. Dockyard, Chatham.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
L1 and E2, Submarines ..	—	—	—	—	—
C140 and C141, Coal lighters	—	—	—	—	—
WORK ON HAND—					
E7, E8, E12 and E13, Submarines	—	—	—	—	—
Chatham, Lowestoft and unnamed vessel, cruisers	—	British Gov.	—	—	—
R.F.A.'s Attendant and Servitor, oil vessels ..	—	—	—	—	—

The following vessels are to have large refits during the present financial year, viz.:—Albion, Bulwark, Canopus, Cornwallis, Diamond, depot-ship Glory, Sapphire, Sentinel, Topaze, Vengeance and Cynthia. Several vessels are to have minor repairs effected.

H.M. Dockyard, Pembroke.

t Fearless, unarmd. cruiser ..	Steel	British Gov.	3,440dis.	—	18,000S.H.P.
WORK ON HAND—					
t Amphion (completing), unarmoured cruiser	Steel	British Gov.	3,440dis.	—	18,000 S.HP.
Nottingham (building), 2nd-class protected cruiser ..	—	—	—	—	—

‡‡ Compound Surface Condensing. d* Diagonal Compound
† Triple. / Compound Non-Condensing.
t Turbine.

H.M. Dockyard, Portsmouth.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
Orion, armoured battleship (completed)	—	—	—	—	—
t King George V., armoured battleship (completed) ..	—	—	—	—	—
WORK ON HAND—					
Iron Duke, armoured battleship (launched)	—	—	—	—	—
Queen Elizabeth (on slip) ..	—	—	—	—	—

VESSELS ENGINED.

Amos & Smith, Ltd., Hull.

Name of Vessel.	Builders.	I.H.P.	Press lbs.
† Epworth	Cochrane & Sons, Ltd.	320	—
† Merisia	,, ,, ...	530	—
† Baldur and Bragi ..	,, ,, ...	515ea	—
† Ingolfur Arnerson ..	,, ,, ...	430	—
† Strosday, Westray and Rowsay	Cook, Welton & Gemmell, Ltd.	300ea	—
† Quereia, Sheldon and Edwardian	,, ,, ,,	530ea	—
† Ractia	,, ,, ,,	835	—
† Solen	,, ,, ,,	535	—
† Pavlova, Kayon d'or and Monimia	,, ,, ,,	550ea	—
† Good Luck	,, ,, ,,	570	—
† Rowsley, Suncloud, Desiree and Imperia ..	,, ,,	480ea	—
† No. 15, Hopper	Blyth's Shipbuilding Co.	690	—
†	Foreign	130	—
†	,, ...	130	—
	Total ..	11,020	

Baird Bros., North Shields.

* Central No 2, screw tug	Jos. T. Eltringham & Co. ..	750	150
d Pen C. W., paddle tug	,, ,, ,, ..	400	60
	Total ..	1,150	

WORK ON HAND—
A great deal of repair work is in hand.

Blair & Co., Ltd., Stockton-on-Tees.

S.S. Atlantic City ..	Ropner & Sons, Ltd., Stockton-on-Tees	2,400	—
Hopper Barge, Nos. 22 and 23	,, ,, ,,	1,600ea	—
S.S. Geddington Court	Northumberland S.B. Co., Howdon-on-Tyne	2,400	—
S.S. Indianolo	Richardson, Duck & Co., Thornaby-on-Tees	2,450	—
S.S. Windsor	Craig, Taylor & Co., Ltd., Thornaby	2,850	—
S.S. Rockpool	Ropner & Sons, Ltd., Stockton-on-Tees	2,300	—
S.S. Winlaton	Robt. Thompson & Sons, Sunderland	1,850	—
S.S. Lord Cromer ..	Craig, Taylor & Co., Ltd., Thornaby	2,550	—
S.S. Fishpool	Ropner & Sons, Ltd. Stockton-on-Tees	2,300	—
S.S. Nautwen	Richardson, Duck & Co., Ltd., Thornaby	2,300	—
S.S. West Wales ..	Blyth Shipbuilding Co., Ltd.	2,350	—
S.S. Twickenham ..	Ropner & Sons, Ltd., Stockton-on-Tees	2,600	—
S.S. Buranda	Richardson, Duck & Co., Ltd., Thornaby	1,950	—
S.S. Shakespeare ..	J. L. Thompson & Sons, Sunderland	1,800	—
S.S. Narcis	Antwerp Engineering Co., Antwerp	2,050	—
S.S. Novington	Richardson, Duck & Co., Ltd., Thornaby	1,950	—
S.S. Nutureton	Ropner & Sons, Ltd., Stockton-on-Tees	2,700	—
S.S. Warley Pickering	Sir R. Dixon & Co., Ltd., Middlesbro'	2,250	—
S.S. Willerby	Ropner & Sons, Ltd., Stockton-on-Tees	1,950	—
S.S. Eddystone	Richardson Duck & Co., Ltd., Thornaby	2,350	—
S.S. Hannington Court	John Priestman & Co., Sunderland	2,650	—
S.S. Thistleard	Craig, Taylor & Co., Ltd., Thornaby	2,250	—
S.S. Trentwood	Wm. Harkess & Son., Ltd., Middlesbro'	800	—

t Turbine † Triple. * Compound.
d Diagonal.

Blair & Co., Ltd., Stockton-on-Tees.

(Continued)

Name of Vessel.	Builders.	I.H.P.	Prs.
S.S. Sturton	Ropner & Sons, Ltd., Stockton-on-Tees	2,400	—
S.S. Burnaby	Richardson, Duck & Co. Ltd., Thornaby	1,950	—
S.S. Marathon	Irvine's Shipbuilding Co. Ltd.	2,650	—
S.S. Cabo Cervera	Euskalduna Co., Bilbao (Spain)	1,150	—
S.S. Cabo Menor	Greenock & Grangemouth Dockyard Co.	1,150	—
S.S. Taylor	Richardson, Duck & Co. Ltd. Thornaby	2,450	—
S.S. Inglemoor	Blyth Shipbuilding Co., Ltd.	2,350	—
S.S. Swinden	Craig, Taylor & Co., Ltd. Thornaby	2,850	—
S.S. Salmonpool	Ropner & Sons, Ltd. Stockton-on-Tees	2,650	—
S.S. Clan Macbride		(2,350	—
S.S. Harpeake	Sunderland Shipbuilding Co. Ltd.	2,650	—
		76,850	

In addition 7 new boilers have been built for trawlers, having an aggregate I.H.P. of 1,800.

Total for the year .. 78,650

Central Marine Engine Works, West Hartlepool.

Thorpwood	British	1,400	—
Oakfield	"	2,030	—
Arabistan and Shahristan	"	3,710ea	—
† Quebra	Foreign	2,180	—
† Marguerite	Foreign	1,670	—
† Penolver	British	1,800	—
† Flixton	"	2,280	—
† Burma	Foreign	3,030	—
† Confield	British	1,390	—
† Harden	"	1,170	—
† Arakan	Foreign	3,910	—
† Boscastle	British	1,440	—
† Arachne	"	1,800	—
† Baharistan	"	2,030	—
† Mokta	"	1,750	—
† Beeton	Foreign	4,000	—
† Talavera	British	1,750	—
† Cyrena	"	1,460	—
† Batjan	Foreign	4,000	—
	Total	46,510	

George Clark, Ltd., Sunderland.

S.S.'s Portuguese Prince, Melton, Normanton, Katoa, Rondo, Nervion, Shelsa, Throstle, Lucellum, Reine, Escalona Hillingdon, Kenmore, Larchmore, Fullerton, Cove, Laertis, Edlington, Joachim Brinch Lund, Michael Whitaker. Total, 20 engines. Total nominal horse-power by Lloyds' Rules, 8,961. Estimated indicated horse-power, 35,800. Exclusive of new boilers supplied for old ships.

Crabtree & Co., Great Yarmouth.

*	1 Drifter	Crabtree & Co., Ltd.	180	140
†	1 Drifter	" " "	225	180
*	2 Drifters	" " "	650	180
†	1 Trawler	" " "	420	180
†	1 Trawler	" " "	500	200
*	5 Drifters	Cochrane & Sons, Ltd.	940	140
†	1 Drifter	" " "	225	180
*	4 Drifters	J. Chambers	580	140
†	1 Drifter	" " "	225	180
*	1 Tug	Rennie Forrest	250	130
†	1 Fire-float	" " "	500	150
*	2 Drifters	Fellows & Co., Ltd.	410	140
		Total I.H.P.	5,105	

Engines in hand, total 1,000 I.H.P.

John Dickinson & Sons, Ltd., Sunderland.

S.S.'s Southern, Florentia, Thessalia, Hindustan, Turbo, Orphens, Finchley, Daghestan, Maston, Highbury, Cheniston, Portloe, Scarsdale, Fulgens, Combe, Capbreton, Helmsmuir, Murjek, Adenwen.

The Lloyd's nominal horse-power is 6,481, and the estimated indicated horse-power is 38,940. Eight auxiliary boilers have also been built.

G. T. Grey, South Shields.

**	Waal, cargo steamer	A. Vuyk & Sons	880	—
**	Luna, cargo steamer	"	1,050	—
**	Drafn cargo steamer	Meyers Shipbuilding Co.	550	—
**	Bienvenido, cargo and passenger	A. Vuyk & Sons	930	—
**	Panama, cargo and passenger	Dundee Shipbuilding Co.	950	—
**	Thyra Menier, cargo steamer	Blyth Shipbuilding Co.	735	—
**	Yssel, cargo steamer	A. Vuyk & Sons	880	—
‡	Royal Sovereign, water-boat	W. Huntley	75	—
**	Agnes H. Hastie, trawler	J. T. Eltringham & Co.	460	—
**	Robert Hastie, trawler	"	460	—
**	Wanstead, cargo steamer	Dundee Shipbuilding Co.	760	—
		Total	7,730	

R. & W. Hawthorn, Leslie & Co., Ltd., St. Peter's Works, Newcastle-on-Tyne.

1 Battleship, 2 Destroyers, 1 Cargo Vessel, 82,850 horse power. Engines built for vessels launched by same Company, see launch section

† Triple. * Compound. ** Tri-Compound. ‡ High Pressure.

T. & J. Hosking, Ltd., London.

Sets of engines, British and Foreign Total, 2,170 I.H.P.

McColl & Pollock, Ltd., Sunderland.

	Name of Vessel.	Builders.	I.H.P.	Prs.
†	Libra and Corona	Dundee Shipbuilding Co.	186ea	—
†	Pagona	"	900	—
†	La Palma	W. Harkess & Son, Ltd.	950	—
†	Kayvernol and Pereira Passos	Smith's Dock Co., Ltd.	160ea	—
†	Lurasupita	Compania Euskaldena, Bilbao	420	—
†	Sheafarrow	Blyth Shipbuilding Co.	1,700	—
†	Beech Tree	Antwerp Engineering Co.	1,000	—
†	Lestor	Mackay Bros.	850	—
†	Eleanor	Antwerp Engineering Co.	850	—
†	Carron Park	Mackay Bros.	850	—
†	John Shaw	W. Harkess & Son	1,000	—
†	Modemi	Antwerp Engineering Co.	1,100	—
			11,440	
	12 additional Boilers		3,015	—
		Total	14,155	

WORK ON HAND.

A fair number of orders for 1913 are in.

Mersey Engineering Works Co., Ltd., Liverpool.

*	4 Launches	Pimblott & Sons, Northwich	20	120
*	1 Launch	" "	25	120
	1 Motor Lighter	" "	50	—
*	1 Tug	" "	250	130

North-Eastern Marine Engineering Co., Ltd., Wallsend-on-Tyne and Sunderland.

Port of Registry.

Arnside	For Sunderland	660	—
Ardoyne	" Aberdeen	2,040	—
Ashtree	" Caen	900	—
Anglo-Californian and Anglo-Egyptian	" London	3,600ea	—
Alfred Nobel	" Sandefjord	2,330	—
Betty	" Copenhagen	1,320	—
Clio and Comanchee	" Hamburg and Liverpool	3,030ea	—
Chinchia and Curaca	" London	2,880ea	—
Cotswold Range	" West Hartlepool	2,200	—
Denise	" Caen	1,140	—
Derindje	" Hamburg	2,960	—
Ethel Duncan	" Cardiff	1,545	—
Easton	" Sunderland	935	—
Eastwell	" Sunderland	3,620	—
Elvet	" Newcastle	1,200	—
Fotis	" Cephalonia	1,985	—
Fauvette	" London	3,200	—
Genevieve	" Caen	1,140	—
Gerald Turnbull	" Cardiff	1,720	—
Haidar Pascha and Hornfels	" Hamburg and Lubeck	2,260ea	—
Haworth	" Newcastle	1,950	—
Heslerside	" Newcastle	2,170	—
Hispania	" Gothenburg	1,250	—
Kanjean	" Amsterdam	4,300	—
Karpet	" Trieste	2,050	—
Kalix	" Sandefjord	1,760	—
Laconia	" Trieste	2,880	—
Marcelle	" Caen	1,140	—
Maskinonge	" Liverpool	2,905	—
Muntenia	" London	1,590	—
Newtonards	" Seaham Harbour	830	—
Ninian, Nitonian and Nubian	" Liverpool	3,060ea	—
Numidia	" Trieste	2,500	—
Oifjeld	" Sandefjord	1,380	—
Prosper III.	" Drammen	2,045	—
Petra	" Tonsburg	1,395	—
Port Lincoln and Port MacQuartie	" London	4,650ea	—
Queen Louise	" Glasgow	2,600	—
Ranvik	" Sandefjord	2,940	—
Riding	" Newcastle	1,200	—
Salamanca	" Newcastle	1,750	—
Siljestad	" Christiania	2,045	—
Steinstad	" Christiania	1,375	—
Silonica	" Christiania	1,670	—
San Jose	" Christiania	1,825	—
Torridge	" Cardiff	2,875	—
Uskmoor	" Newcastle	1,750	—
Uskside	" Newport, Mon.	1,311	—
Victoria	" Gothenburg	1,250	—
Weywisbrook	" Glasgow	1,700	—
Weerwood	" Middlesbrough	1,680	—
Wear	" Newcastle	890	—
Zvir	" Fiume	1,925	—
Andalucia (new boiler)		504	—
		129,629	

Comprising 12 sets of Quadruple Expansion engines 41,120 I.H.P., and 48 sets of Triple Expansion engines of 88,005 I.H.P. Schmidt's Superheaters were fitted to 8 boilers for Quadruple engines, working at a pressure of 220 lbs. and to 12 boilers for Triple engines, working at pressures varying from 180 to 214 lbs.

Of the above 61 vessels, 78,249 I.H.P., were constructed at the Wallsend Works and 51,380 at Sunderland Works.

† Triple. * Compound.

The Parsons Marine Steam Turbine Co., Ltd., Wallsend.

Name of Vessel.	Builders.	I.H.P.	Press. lbs.
gt S.S. Hantonia	The Fairfield Shipbuilding and Engineering Co., Ltd.	—	—
t S.S. Reina Victoria Eugenia	Swan, Hunter & Wigham Richardson, Ltd., Neptune Works		—
t H.M.S. Firebrake	Yarrow & Co., Ltd.		
t H.M.S. Amphion	H.M. Dockyard, Pembroke		
gt S.S. Cairnross	Wm. Beckford & Sons, Ltd.		
t H.M.S. Lynx	The London & Glasgow Engineering & Iron Shipbuilding Co., Ltd.		—
t H.M.S. Midge	,, ,,		
	Total	96,800	

Plenty & Son, Ltd., Newbury.

† 2 Engines	For Foreign Vessels	1,000	—
* 8 Engines	,, ,,	940	—
† 2 Engines	,, British Vessels	620	—
* 8 Engines	,, ,,	1,850	—
† 1 Engine	,, Colonial Vessels	300	—
* 7 Engines	,, ,,	440	
	Total	5,150	

In addition 28 Kromhout Marine Oil Engines ranging, from 25 to 90 B.H.P., for vessels built in Great Britain and the Colonies. Total B.H.P. 1,400.

Richardsons, Westgarth & Co., Ltd., Hartlepool.

T.S.S. La Correntina	6,500	—
S.S. Digby	3,800	—
S.S.'s Eloby, Elele, and Lucia	3,000ea	—
S.S. Time	2,600	—
S.S.'s Æon and Hochelaga	2,500ea	—
S.S.'s Start Point, West Point, Bowes Castle and No. 640	2,350ea	—
S.S. Oaklands Grange	2,150	—
S.S.'s New Londoner, Ockley, Fridland, Holmwood, Lynton Grange, Manchester Citizen, Denby Grange and Hollington	2,000ea	—
S.S.'s Luise Horn and Newfield	1,800ea	—
S.S. Eskbridge	1,650	—
S.S. Eavestone (Diesel oil engines)	1,150	—
S.S.'s Karl Schroers, Channel Trader and Baron Ailsa	1,100ea	—
S.S. Troldfos	1,050	—
S.S. Blackhead	1,000	—
S.S. Tioga	800	—
	67,000	
Steam Turbines	20,600	
Rolling Mill Engines	16,000	
Gas Engines	3,450	—
Marine and Water Tube Boilers	4,500	—
Total I.H.P. for the year	111,550	

In addition to the above, a large amount of miscellaneous work has been completed, including "Contraflo" Condensing Plants, Regenerative Accumulators, etc.

The Shields Engineering & Dry Dock Co., Ltd., North Shields.

Cargo vessel	560	—
2 Cargo vessels	635ea	—
Cargo vessel	1,150	—
Trawler	580	—
2 Whalers	490ea	—
2 Whalers	675ea	—
2 Whalers	760ea	—
Tug	845	—
Tug, twin-screw	775	—
Tug and salvage steamer	1,260	—
Total	10,290	

WORK ON HAND—

2 Trawlers	485ea	—
2 Whalers	375ea	—
Cargo	1,100	—
Tug	600	—
Lighthouse tender	800	—
Total	4,220	

Sisson & Co., Ltd., Gloucester.

‡‡Unknown, Australian	Colonial	70-75	140
††Goring	Salter Bros., Folly Bridge, Oxford	65	175
f Unknown	Unknown	30	150
Return Tube Marine Boiler	Foreign	—	125

Have also completed during the year about 3,000 Brake H.P. "Sisson" enclosed self-lubricating engines, and about 400 Brake H.P. open type engines.

WORK ON HAND—

f Unknown	Colonial	70-75	160
††Unknown	Salter Bros., Folly Bridge, Oxford	65	175
‡‡Royalty		135	150

One "Sisson" water-tube boiler for 56 I.H.P. machinery, and about 750 Brake H.P. "Sisson" enclosed engines, and about 750 Brake open engines.

Smith's Dock Co., Ltd., Middlesbrough-on-Tees.

21 sets of engines. Total 12,000 I.H.P.

Vauxhall and West Hydraulic Engineering Co., Ltd., Luton, Bedford.

†*f* 15 Vessels	British and Foreign	1,675	2,110

WORK ON HAND—

‡‡*f* 7 Vessels	British and Foreign	1,375	945

gt Geared Turbines. *t* Turbines. † Triple. * Compound.
‡‡ Compound Surface Condensing. †† Triple Surface Condensing.
f Compound Non-condensing.

The Wallsend Slipway & Engineering Co., Ltd., Wallsend-on-Tyne.

Name of Vessel.	Builders.	I.H.P.	Press. lbs.
S.S. Birnia, single-screw	Swan, Hunter & Wigham Richardson, Ltd.	2,500	—
S.S. Cordelia, single-screw	,, ,,	2,850	—
S.S. Ranella, single-screw	,, ,, ,,	2,800	—
S.S. Mitra, single-screw	,, ,, ,,	2,800	—
S.S. Natica, single-screw	,, ,, ,,	2,800	—
War Vessels, twin-screw	,, ,, ,,	73,500	—
S.S. Karl Schurz, twin-screw	,, ,, ,,	5,500	—
S.S. Emil L. Boas, twin-screw	,, ,, ,,	5,500	—
S.S. City of Bristol, single-screw	,, ,, ,,	3,850	—
S.S. Shwedagon, single-screw	Sir W. G. Armstrong, Whitworth and Co., Ltd.	1,300	—
S.S. Adorna, single-screw	,, ,, ,,	2,900	—
S.S. Clan MacArthur, single-screw	,, ,, ,,	5,200	—
S.S. Clan MacTavish, single-screw	,, ,, ,,	5,200	—
S.S. Herbert G. Wylie, single-screw	,, ,, ,,	2,000	—
S.S. Russian Prince, single-screw	Tyne Iron S.B. Co.	2,050	—
S.S. Yarrowdale, single-screw	Wm. Dobson & Company	2,250	—
	Total Horse Power	123,000	

In addition to the above, 25 new boilers were supplied representing a total horse power of 16,770. Also 77 complete oil burning installations for marine and land work, representing a total of over a quarter of a million horse power.

R. C. Walker, Grimsby.

‡‡Gambumu	W. H. Warren, New Holland	110	120
WORK ON HAND—				
‡‡Tug	W. H. Warren, New Holland	200	130
‡‡ ,,	,,	180	130
‡‡ ,,	,,	110	130

Charles D. Holmes & Co., Ltd., Hull.

Machinery for 35 vessels ..... total 17,170 —

SCOTCH.

THE CLYDE, Etc.

Ailsa Shipbuilding Co., Ltd., Troon and Ayr.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
Hapura, Hatinga, Itassuge, Hapuhy and Itagiba, twin-screws	—	Foreign	2,172ea	—	—
Glen Avon, paddle-steamer	—	British	509	—	—
Clyde, twin-screw tug	—	,,	187	—	—
Bermagui, twin-screw	—	Colonial	403	—	—
m St. George, triple-screw	—	,,	180	—	—
Barges, etc.	—	Foreign	1,896	—	—

All engines, except Kromhout motor, by same establishment.

Alley & McLellan, Ltd., Polmadie.

P.S.	Steel	Foreign	100	100	150
P.S.	,,	,,	80	80	110
Floating Crane	,,	,,	160	160	—
Barge	,,	,,	340	340	—
S.S.	,,	Colonial	90	90	200
S.W.S.	,,	Foreign	60	60	100
Barge	,,	,,	80	80	—
Oil Barge	,,	,,	400	400	—
Barge	,,	,,	140	140	—
Barge	,,	Congo	300	300	—
S.W.S.	,,	,,	60	60	60
Motor S.S.	,,	,,	10	10	10
Pontoons	,,	Egypt	120	120	—
Barge	,,	East Africa	50	50	—
Barge	,,	,,	40	40	—
Barge	,,	India	600	600	—
Pontoons	,,	Egypt	120	120	—

Engines for S.W.S. for Congo, 60 I.H.P. by same firm.

WORK ON HAND—

2 Dredgers	Steel	Egypt	200ea	200ea	—
3 Lighters	,,	Argentina	400ea	400ea	—

The Ardrossan Dry Dock & Shipbuilding Co., Ltd., Ardrossan.

m O.S. Isleford	—	British	414	—	440
Screw tug, for shipment	—	—	57	—	150
6 Barges	Steel	—	480	—	—
WORK ON HAND—					
‡‡Screw steamer	—	—	834	—	750

m Motor. ‡‡ Compound Surface Condensing.

Barclay Curle & Co., Ltd., Whiteinch, Glasgow.

Name of Vessel.	Built of	Owners.	G.T Regis.	G.T. inclu. erect	I.H.P.
Barah, single-screw		British	3,316		a2,500
Czar, twin-screw		Foreign	6,703		6,200
Bankura and Barcora, S.S.		British	3,318ea		2,500ea
Neuralia and Nevasa, T.S.			9,456ea		7,500ea
City of Dunkirk, single-screw		British	6,020		3,700
Borderland, single-screw		,,	1,828		1,450

Engines by same Company.

William Beardmore & Co., Ltd., Dalmuir.

T.S.S. Wandilla		Colonial	8,000tns.		8,500
T.S.S. Willochra		,,	8,000		8,500
H.M.S. Dublin		Brit. Gov.	5,500		25,000

George Brown & Co., Greenock.

Kopoola, cargo and pass.		Colonial	293		
No. 74, stern wheeler	—	Foreign	27		
Zelia, coaster	—	British	387		
Aurelie G., tug	—	Colonial	138		
No. 77, tug	—	,,	43		
No. 80, tug	—	Foreign	122		
WORK ON HAND—					
Vessels			abt.4,000		

John Brown & Co., Ltd., Clydebank.

Hydra, torpedo-boat destroyer	—	British Ad.			
Southampton, second-class cruiser	—	,,			
Sapphire, pleasure yacht	—	British			
Acasta, torpedo-boat destroyer	—	British Ad.			
Achates, torpedo-boat destroyer	—	,,			
Niagara, triple-screw mail steamer	—	Colonial			

Engines by same Company.

John Brown & Co., in addition, have also constructed the machinery for H.M.S. "Queen Mary" (battle-cruiser, built by Palmer's Co., Hebburn).

Caird & Co., Ltd., Greenock, N.B.

ta Beltana, twin-screw		Steel	British		11,120	9,000
ta Nankin, twin-screw		,,	,,	—	6,846	4,500
ta Novara, twin-screw		,,	,,	—	6,850	4,500
ta Benalla, twin-screw		,,	,,	—	11,120	9,000

Engines by same Company.

Campbeltown Shipbuilding Co., Campbeltown.

† Campania, S.S.		Steel	Swedish		1,200	
† Progress III., S.S.		,,	,,		3,534	
† Garm, S.S.		,,	,,		1,230	
† Saint Paul, S.S.		,,	French		1,610	

Erections, 980 tons.

W. Chalmers & Co., Ltd., Ruthergien.

m Motor Barge	—		Foreign		54	45
WORK ON HAND—						
4 Motor Coasters	—		British		100ea	—
1 Salvage Tug	—		Colonial		—	—

Clyde Shipbuilding & Engineering Co., Ltd., Port Glasgow.

Fordonian, Diesel motor ship	—	British	2,368	—	1,100
Sir Richard Awdry, S.S.	—	,,	2,234	—	1,200
Sanwarine, S.S.	—	,,	1,740	—	1,150
Florentine, S.S.	—	,,	1,740	—	1,150
Tuggerah, S.S.	—	Colonial	749	—	1,000
Perla (machinery only)	—	Foreign	—	—	1,900
Amra (machinery only)	—	,,	—	—	1,900
Caterina Gerolimich (machinery only)	—	,,	—	—	1,700

Engines by same Company.

R. Duncan & Co., Ltd., Port Glasgow.

† Mariston, screw steamer	Steel	British	3,793	—	1,600
† Iriston ,, ,,	,,	,,	3,782	—	1,600
† Queen Margaret ,, ,,	,,	,,	4,972	—	2,300
† Agnes Duncan ,, ,,	,,	,,	2,512	—	1,350

Dunlop, Bremner & Co., Ltd., Port Glasgow.

Mountpark, quarter-deck	—	British	1,376	—	850
Tregarth, quarter-deck	—	,,	1,968	—	1,000
Salerno, shelter-deck	—	,,	2,071	—	1,400
Baron Wemyss, shelter-deck	—	,,	1,610	—	1,000

Engines of the first three vessels by same Company.

WORK ON HAND—
Four steamers, aggregating 8,222 Board of Trade tons and 6,300 I.H.P. Machinery to be constructed by Builders.

The Fairfield Shipbuilding & Engineering Co., Ltd., Govan.

Endeavour, twin-screw	—	British		—	—
Ermine, twin-screw	—	Colonial		—	—
Empress of Russia and Empress of Asia, quadruple screw turbine	—	Colonial	36,636	—	55,200

Ferguson Brothers, Port Glasgow.

No. 204, tug	—	British	200	—	850
No. 205, dredger	—	,,	1,400	—	1,600
No. 206, tug	—	,,	1,270	—	1,270
No. 207, dredger	—	,,	1,200	—	1,600

Engines by same Company.

WORK ON HAND—					
4 Vessels	—	—	5,000	—	—

ta Twin Quadruple. † Triple *m* Motor.

W. Fife & Sons, Fairlie.

Name of Vessel.	Built of	Owners.	G.T Regis.	G.T inclu. erect	I.H.P.
10 vessels (cutters, schooners, yachts)	Wood and Compo.	British and Colonial	Thames Meas. 198		

Fleming & Ferguson, Ltd., Paisley.

* Nos. 404, 405 and 406, hopper steamers	Steel	Colonial		800ea	800ea
* No. 400, hopper steamer	,,	,,		900	800
* No. 403, dredger	,,	,,		600	700
* T.H.C. No. 8, dredger	,,	British		800	800
† Vizcaino No. 1, dredger	,,	Argentine		1,000	800
† Nos. 407 and 408, barges	,,	Colonial		500ea	—
* No. 412, dredger	,,	,,		600	800
† No. 411, dredger	,,	,,		1,500	2,000
* No. 413, barge	,,	,,		500	700
Two sets triple expansion Engines shipped for Canada					3,200

Engines by same establishment.

John Fullerton & Co., Paisley.

* Awahou, twin-screw		Steel	Colonial	249	407	500
* Mango, single-screw		,,	British	249	340	360
† Warrener, single-screw		,,	Colonial	413	564	705
† Sir Roger Bacon		,,	British	567	808	800

The Greenock & Grangemouth Dockyard Co., Ltd., Greenock and Grangemouth.

Greenock Yard.

Hera, single-screw	—	Foreign	4,705	—	2,900
Strathmore, single-screw	—	British	4,337	—	2,000
Strathearron, single-screw	—	,,	4,347	—	2,000
River Orontes, single-screw	—	,,	4,351	—	2,000

Grangemouth Yard.

Baron Ailsa, single-screw	—	British	1,835	—	1,100
Cabo Menor, single-screw	—	Spanish	2,042	—	1,150
Tambar, twin-screw	—	Colonial	456	—	694
Sant Tookaram, single-screw	—	,,	291	—	1,000
Pulgambar, single-screw	—	,,	1,160	—	2,770
Peggy, oil motor, single-screw	—	British	62	—	50

Hanna, Donald, & Wilson, Ltd., Paisley.

Barge for shipment	—	—	100	—	100

David & William Henderson & Co., Ltd., Partick, Glasgow.

Angola, screw	Steel	British	4,962	—	2,450
Benefactor, screw	,,	,,	5,511	—	2,980
Nicosian, screw	,,	,,	6,369	—	3,500
Posillipo, screw	,,	Foreign	5,964	—	2,875
Masirua, screw	,,	British	4,960	—	2,450

A. & J. Inglis, Ltd., Point House Shipyard.

d *Erin's Isle, paddle steamer	—	British	633	—	1,600
gt Curzon, twin-screw	—	,,	700	—	2,500

Engines by same Company.

Lobnitz & Co., Ltd., Renfrew.

† Steam hopper barges, Nos. 8 and 10	—	British	842ea	—	1,450ea
* Rosslyn, bucket dredger	—	,,	702	—	1,100
* Bucket dredgers, Nos. 3 and 4	—	Foreign	565ea	—	1,200ea
* Hardi No. 107, steam pilot boat	—	,,	215	—	700
* Lusanga, sternwheel steamer	—	British	316	—	400
* Delver, bucket dredger	—	Colonial	217	—	400
* B.A.H.W. No. 3, bucket dredger	—	British	509	—	1,100
* Caiman, steam hopper barge	—	Foreign	349	—	350
† Dredger No. 7, bucket dredger	—	British	780	—	1,200
* No. 125, Steam anchor boat	—	Foreign	166	—	400
* Victor Largeau, sternwheel steamer	—	,,	150	—	300
* Hopper Barge No. 9	—	British	282	—	100
Rockcutters	—	Foreign	600	—	750

London & Glasgow Engineering & Iron Shipbuilding Co., Ltd., Govan.

T.S.S. Evangeline	Steel	British	4,360	—	5,500
H.M.A.S. Sydney	,,	,,	5,400dis.	—	25,000
H.M.S. Woolwich	,,	,,	2,450	—	2,600

Engines by same Company.

During 1912, we delivered completed :—

H.M.S. Yarmouth	—	—	5,270	—	—
S.S. Indraghiri	—	—	5,723	—	—
T.S.S. Evangeline	—	—	—	—	—

R. McAllister & Sons, Dumbarton.

Clio, cutter yacht	Wood	British	9	—	—
Finneary, cutter yacht	,,	,,	4	—	—
Kia Ora, motor yacht	,,	,,	46	—	—
Otter, motor yacht	,,	,,	29	—	—

P. McGregor & Sons, Kirkintilloch.

‡‡North Star, steam tug	Steel	Foreign	35	—	140
m Innisagra, motor coaster	,,	British	95	—	100
m Innisdhu, motor coaster	,,	,,	95	—	100
m Innisheg, motor coaster	,,	,,	95	—	100
m Inniscroone, motor coaster	,,	,,	95	—	100
Nos. 65 and 66, Barges	—	,,	10ea	—	—
WORK ON HAND—					
2 Vessels	—	—	95ea	—	100ea
2 Vessels	—	—	115ea	—	100ea

* Compound. † Triple. *d* Diagonal Compound.
gt Geared Turbines. ‡‡ Compound Surface Condensing. *m* Motor.

Mackie & Thomson, Ltd., Govan.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
Flaxland, T.S.S. cargo	—	Colonial	399	—	450
Taquary, T.S.S. cargo	—	Foreign	1,943	—	1,450
Jacuhy, T.S.S. cargo	—	,,	1,951	—	1,450
Adriatico and Ionio, T.S.S. cargo and pass.	—	,,	1,446ea	—	1,550ea
Itaquera, T.S.S. cargo and pass.	—	,,	2,200	—	2,000
Wandana, T.S.S. cargo and pass.	—	Colonial	920	—	1,200
Koning Albert, trawler	—	Foreign	220	—	420
7 Barges	—	,,	795	—	—
WORK ON HAND—					
4 Vessels	—	— abt.	20,000	—	—

Archd. McMillan & Son., Ltd., Dumbarton.

Pascal, S.S.	—	British	5,610	—	—
Cairnhill, S.S.	—	,,	4,981	—	—
Saint Hugo, S.S.	—	,,	4,874	—	—
Saint Andrew, S.S.	—	,,	4,874	—	—
Kirkoswald, S.S.	—	,,	4,022	—	—
Baron Vernon, S.S.	—	,,	1,780	—	—

Russell & Co., Port Glasgow.

Infanta Isabel, twin-screw pass. and emigrant str.	—	Spanish	8,169	—	—
Ajana, twin-screw, pass., emigrant and cargo	—	British	7,758	—	—
Crown of Seville, shelter-deck cargo	—	,,	5,825	—	—
Valetta, cargo steamer	—	,,	5,870	—	—
Vestalia, cargo steamer	—	,,	5,528	—	—
Frankmount, cargo steamer	—	,,	5,134	—	—
Niceto de Larrinaga, shelter-deck cargo	—	,,	5,018	—	—
Saint Ursula, cargo steamer	—	,,	5,010	—	—
Penang Maru, cargo steamer	—	Japanese	4,965	—	—
Bellorado, cargo steamer	—	British	4,648	—	—
Hawkhead, cargo steamer	—	,,	4,622	—	—
Saint Dunstan, cargo steamer	—	,,	4,422	—	—
Dundrennan, cargo steamer	—	,,	4,247	—	—

William Hamilton & Co., Ltd., Port Glasgow.

Maidan, steamer	—	British	8,205	—	4,800
Jacatra, steamer	—	Dutch	5,366	—	3,200
Samarinda, steamer	—	,,	6,833	—	4,750
Intombi, steamer	—	British	3,884	—	2,600
Soerabaya I., floating dock	—	Dutch	3,750	—	—
Dryden, steamer	—	British	5,839	—	3,200
Crofton Hall, steamer	—	,,	6,150	—	3,000

Wm. Denny & Bros., Dumbarton.

Crane lighter No. 1, C.B.	—	British	2,380	—	—
Princess Victoria, turbine	—	,,	1,687	—	—
Indarra, T.S.S.	—	Colonial	9,735	—	—
Infanta Isabel De Borbon, C.T.S.	—	Foreign	10,020	—	—
Queen Alexandra, turbine	—	British	785	—	—
Wahine, turbine	—	Colonial	4,443	—	—
Light-draught craft shipped abroad in pieces	—	—	4,875	—	—

A. Munro, Ardrishaig.

m Ella, aux. lugger	—	British	23	—	15-20
m Annie, aux. lugger	—	,,	23	—	15-20
m Clan Mackae, aux. lugger	—	,,	23	—	15-20

Murdoch & Murray, Ltd., Port Glasgow.

2 Barges (for shipment), Sailing	Steel	Foreign	100	—	—
Yurimaguas, S.S.	,,	,,	307	—	610
Queen-Empress, P.S.	,,	British	411	—	1,500
Mosqueiro, T.S.S.	,,	Foreign	525	—	1,600
Coombar, T.S.S.	,,	Colonies	581	—	670
Soure, T.S.S.	,,	Foreign	597	—	1,180
WORK ON HAND—					
5 vessels on hand with an aggregate tonnage of 3,000 tons.					

Napier & Miller, Ltd., Old Kilpatrick.

† Omi Maru, S.S.	—	Foreign	3,405	—	3,128
† Fitzroy, S.S.	—	Colonial	623	—	902
* Tury Assu, T.S.S.	—	Foreign	759	—	810
ma Yddraig Goch	—	British	952	—	260
* Cururupu, T.S.S.	—	Foreign	759	—	810
† Saxon Monarch, S.S.	—	British	6,207	—	2,700
† Baron Yarborough, S.	—	,,	2,456	—	1,000

Ritchie, Graham & Milne, Whiteinch.

Passenger Ferry Boat, screw steamer	Steel	British	30	—	60
m M.L. Diamond	,,	Colonial	55	—	60 B.H.P.
S.W.S. Stanley, stern-wheel steamer	,,	Kilindini	160	—	350
Muanense II., screw steamer	,,	Brazil	20	—	50
Tres Irmaos, screw steamer	,,	Foreign	50	—	170
WORK ON HAND—					
1 tug boat, 1 water boat, 2 stern-wheel steamers, 4 barges, 1 floating crane barge, 2 steam launches.					

A. Robertson & Co., Sandbank, Argyllshire.

3 vessels	—	—	71	—	—

m Motor. † Triple. * Compound.
ma Motor Auxiliary.

Scott & Sons, Bowling, nr. Glasgow.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
† Runo, crew steamer	Steel	Russian	776	—	600
* Milhafre, screw steamer	,,	Spanish	67	—	230
† Iguape, screw steamer	,,	Brazilian	692	—	620
* Alfred Colebrooke, screw steamer	,,	British	56	—	120
* Senegal, screw steamer	,,	,,	65	—	250
* Rattray Head, screw steamer	,,	,,	252	—	330
* Jucaro, screw steamer	,,	,,	67	—	250
† Carnalea, screw steamer	,,	,,	625	—	750

Scotts' Shipbuilding & Engineering Co., Ltd., Greenock.

T.S.S. Letitia	—	—	8,991	—	6,850
3 Lighters, Garceta, Gavilan, and Garza Real	—	—	471	—	—
T.S.S. Ixion	—	—	10,220	—	5,500
S.S. Benmohr	—	—	4,805	—	2,700
S.S. Nessian	—	—	6,275	—	2,500
H.M.S. Ajax	—	—	23,000Dis.	—	31,000
H.M.S. Maidstone	—	—	3,605	—	3,000
Engines by same Company.					

Wm. Simons & Co., Ltd., Renfrew.

No. 517, dredger	—	Foreign	2,281	—	3,540
Nos. 521 and 522, Dredgers	—	Colonial	1,053ea	—	1,850ea
No. 523, dredger	—	,,	1,620	—	2,650
Nos. 524 and 525, pontoons	—	,,	136ea	—	180ea
No. 526, pontoon	—	,,	142	—	180
No. 529, dredger	—	British	500	—	660
No. 530, dredger	—	Colonial	150	—	125
No. 531, barge	—	British	572	—	865
Besides the above, a large quantity of dredging machinery, boilers, etc., were also supplied during the year.					

Alex. Stephen & Son, Ltd., Govan.

† Mascara, screw	Steel	British	—	4,956	—
a Arunda, twin-screw	,,	,,	—	4,062	—
a Anversville, twin-screw	,,	Antwerp	—	7,644	—
† Chagres, twin-screw	,,	British	—	5,288	—
a Camberra, twin-screw	,,	Melbourne	—	7,660	—
Engines by same Company.					

Yarrow & Co., Ltd., Glasgow.

Archer and Attack, T.B.D.	—	Brit. Admty.	—	—	14,000ea
Firedrake, Lurcher and Oak, T.B.D.	—	,,	—	—	20,000ea
Winchester, turbine yacht	—	American	301	—	5,000
Comte de Flandre, shallow draught steamer	—	British	430	—	500
Luia, shallow draught str.	—	Portuguese	128	—	175
Guardacostos, Nos. 1, 2 and 3, twin-screw motor gun-boats	—	Colom. Gov.	41ea	—	120ea
Motor Launch	—	Foreign	25	—	90
Yarrow Water Boilers for 3 passenger steamers building by A. & J. Inglis, Ltd., Glasgow—total pow. *i.e.*, 3,000 per ship	—	Indian Rly. Co.	—	—	9,000
Steam Drums and Water Pockets for 40 Yarrow boilers for 2 battleships, horse-power of each ship 30,000,	—	Italian Gov.	—	—	tot.60,000
WORK ON HAND—					
Yarrow Water-tube Boiler Installation for Chilian battleships Almirante Latorre and Almirante Cochrane	—	Chilian Gov.	—	—	40,000ea
Haughty, Havock, Hereward and Hotspur, T.B.D.	—	Brit. Admty.	—	—	—
Steam Drums and Water Pockets for 9 Yarrow boilers for 3 torpedo boat destroyers, 22,000 horse-power per ship	—	Italian Gov.	—	—	tot.66,000

THE FORTH, Etc.

John Cran & Co., Leith.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
s Inniskea, motor coaster	—	British	152	—	—
Lilian, screw tug	—	Foreign	14	—	70
sc Vivian, screw tug	—	,,	28	—	110
Ada, auxiliary	—	British	10	—	—
s Innisargie, ketch	—	,,	165	—	—
—	—	—	—	—	70
Engines by same firm.					

Hawthorns & Co., Ltd., Victoria Ship Yard and Leith Engine Works, Leith.

Tern, lightship	Iron & steel	British	200	—	—
Alarm, lightship	,,	,,	247	—	—
Good Hope, st. screw tug	Compo	,,	60	—	300
WORK ON HAND—					
St. screw yacht	Steel		477Y.M.	—	1,000

* Compound. † Triple. *a* Quadruple.
s Jet Condensing. *sc* Surface Condensing.

Victoria Dock Yard:—

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
Benito Villanueva, insulated barge	Steel	Foreign	1,008	—	—
Guayamaz screw tug	,,	,,	150	—	450
Ayuntre screw tug	,,	,,	150	—	450

See also Work Completed.

Mackay Bros., Alloa.

† Nestor cargo S.S.	Steel	Foreign	1,420	—	850
Ethel Duncan, cargo S.S.	,,	British	2,510	—	1,545
Carrompark, cargo S.S.	,,	,,	1,401	—	850
WORK ON HAND—					
Oil Tank Steamer	—	—	5,000	—	—
Molasses Tank Steamer	—	—	5,000	—	—
Cargo Steamer	—	—	3,700	—	—

THE TAY.

Caledon Shipbuilding & Engineering Co., Ltd., Dundee.

Name of Vessel	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
Gouverneur	Steel	Foreign	447	—	550
Princess Royal	,,	British	1,882	—	1,250
Tocoma	,,	,,	1,069	—	950
† Ardevia	,,	,,	3,140	—	2,000
† T.S.S. Dublin	,,	Foreign	1,307	—	1,100
† T.S.S. Edinburgh	,,	,,	1,308	—	1,100
† T.S.S. Mexico	,,	,,	1,308	—	1,100
† Westphalia	,,	British	972	—	1,350

Engines by same Company.

WORK ON HAND—					
m Twin-screw Sebastian	Steel	British	3,400	—	2,000
m Twin-screw Cassis	,,	,,	3,700	—	2,200
a Norwegian	,,	,,	6,390	—	2,750
† Alban	,,	,,	5,300	—	2,300
† S.S. No. 236	,,	,,	1,500	—	1,200
† S.S. No. 237	,,	,,	1,500	—	1,200

The last four to be engined by the same Company.

The Montrose Shipbuilding Co., Ltd., Montrose.

† Viking, screw tug	Steel	British	100	—	300

THE DEE.

The John Duthie Torry Shipbuilding Co., Aberdeen.

Name of Vessel.	Built of	Owners	G.T. Regis.	G.T. inclu. erect.	I.H.P.
Young Sid, steam drifter	—	British	100	—	200
Adoration, steam drifter	—	,,	93	—	250
Lanner, steam drifter	—	,,	103	—	270
Uberty, steam drifter	—	,,	93	—	270
Feasible, steam drifter	—	,,	100	—	200
John Robert, steam drifter	—	,,	89	—	200
Southesk, steam drifter	—	,,	93	—	250
S.D.J., steam drifter	—	,,	100	—	200
Three Kings and Swiftwing, steam drifters	—	,,	98ea	—	250ea
Taranaki and Ratapiko, steam trawler	—	,,	247ea	—	460ea
Petrel, steam trawler	—	French	253	—	520
Loch Tummel and Loch Morar, steam trawlers	—	British	228ea	—	400ea
Vale of Endrick, stm. traw.	—	,,	214	—	400
Loch Ard, steam trawler	—	,,	225	—	425

Forbes & Birnie, Peterhead.

2 Fishing yawls and 2 Motor yachts	—	—	—	—	—

WORK ON HAND—
2 Motor pleasure craft, final particulars not arranged.

Alexander Hall & Co., Ltd., Aberdeen.

Daniel Stroud and Osborne Stroud, trawlers	—	British	209ea	—	420ea
Almirante Blanco, trawler	—	Arg. Rep.	218	—	420
Shelomi, trawler	—	British	175	—	400
Loch Hourn, trawler	—	,,	210	—	420
Plough, Mint, Surmount, and Ocean Reward, drifters	—	,,	95ea	—	250ea
Mediator, trawler	—	,,	180	—	400
Princess Beatrice, trawler	—	,,	220	—	420

Hall, Russell & Co., Ltd., Aberdeen.

Raindrop and Shandwick, steam trawlers	—	British	167ea	—	400ea
Koorah, steam trawler	—	,,	227	—	450
Star of the Isles, steam trawler	—	,,	218	—	450
John T. Graham, steam trawler	—	,,	198	—	450
Kupa, cargo and pass.	—	Foreign	827	—	1,300
Ben Hellen, steam trawler	—	British	197	—	475
Star of the East, steam trawler	—	,,	218	—	450
Cargo-boat	—	,,	483	—	—
Ben Asdale and Ben Tarbert, steam trawlers	—	,,	197ea	—	475ea

† Triple. *c* 4-Cylinder. *m* Motor. *a* Quadruple.

Hall, Russell & Co., Ltd., Aberdeen *(continued).*

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
Strathatholl and Strathmoray, steam trawlers	,,	,,	209ea	—	450ea
Kerdonis, steam trawler	—	Foreign	239	—	475
Granton N.B., steam trawler	—	British	180	—	420
Norah Elsnie and Bracnoll, cargo	—	,,	424ea	—	440ea
Ben Ardna, steam trawler	—	,,	197	—	475
Star of the Empire, steam trawler	—	,,	218	—	450

VESSELS ENGINED.

James Abernethy & Co., Aberdeen.

Name of Vessel.	Builders.	I.H.P.	Press. lbs.
John Robert	John Duthie Torry Shipbuilding Co.	220	—
Southesk	,, ,, ,,	260	—
Three Kings	,, ,, ,,	280	—
Swiftwing	,, ,, ,,	280	—
Loch Ard	,, ,, ,,	450	—
Ginette	,, ,, ,,	550	—

Aitchison, Blair & Co., Clydebank.

‡‡Twin-screw	Foreign	200	130
‡‡Twin-screw	,,	160	120
† Single-screw, Fitzroy	Napier & Miller, Ltd.	900	180
† Twin-screw, Soure	Murdoch & Murray, Ltd.	1,200	180
‡‡Single-screw	Foreign	140	120
† Single-screw, Carnalea	Scott & Sons	900	180
‡‡Single-screw, Tres Irmaos	Ritchie, Graham & Milne	180	120
Single-screw	Foreign	170	120
	Total	3,850	
WORK ON HAND—			
† Single-screw	Aitchison, Blair, Ltd.	900	180
‡‡Single-screw	,, ,,	700	130
† ——	,, ,,	900	180

Campbell & Calderwood, Paisley.

1 set Non-condensing Side Paddle Engines	Alley & MacLellan, Ltd	115	—
1 set Non-condensing Side Paddle Engines	,, ,,	160	—
1 set Stern-Wheel Engines	,, ,,	130	—
1 set Stern-Wheel Engines	Ritchie, Graham & Milne	325	—
1 set Screw Engines	,, ,,	50	—
2 sets Side-Wheel Engines	D. M. Cumming & Co.	320	—
1 set Stern-Wheel Engines	James Pollock, Sons & Co.	80	—
12 sets Compound Screw Engines	Foreign	1,390	—
3 sets Triple-screw Engines	,,	980	—
	Total	3,550	

Cooper & Greig, Dundee.

One set of Triples for Foreign owners, 1,000 I.H.P.

WORK ON HAND—
2 sets of Triples for Foreign owners, 1,400 I.H.P. ea.

Denny & Co., Dumbarton.

t H.M.S. Druid	British	—	—
t Arracan, single-screw	Eastern	—	—
t Princess Victoria	Channell	—	—
t Queen Alexandra	Clyde	—	—
a Indarra, twin-screw	Colonial	—	—
†*t* Infanta Isabel de Borbon	Spanish	—	—
t Crane Lighter, tw.-sc.	Royal Dockyards	—	—

Also a number of sets of machinery for light draught vessels for shipment abroad.

Total .. 58,400

Dunsmuir & Jackson, Ltd., Govan.

† Indrani & Indrakuala	C. Connell & Co., Ltd.	4,000ea	—
† Risaldar & Subadar	,, ,,	2,500ea	—
† Dunachton	,, ,,	2,950	—
† Architect	,, ,,	3,600	—
† Lancefield	,, ,,	2,500	—
a Diplomat	,, ,,	4,500	—
† Intombi	Wm. Hamilton & Co., Ltd.	2,600	—
† Pulganbar	Greenock & Grangemouth Dockyard Co., Ltd.	2,800	—
† Crown of Seville	Russell & Co.	4,000	—
† Baron Vernon	A. McMillan & Sons, Ltd.	1,200	—
† Omi Maru	Napier & Miller, Ltd.	3,300	—
† Baron Yarborough	,, ,,	1,200	—
	Total I.H.P.	41,650	

Also a large number of boilers for shipment, etc., representing about 25,000 I.H.P.

† Triple. ‡‡ Compound Surface Condensing.
a Quadruple. *t* Turbines. †*t* Triple Expansion and Turbines.

Fishers, Ltd., Paisley.

Name of Vessel.	Builders.	I.H.P.	Press. lbs.
‡‡North Star	P. McGregor & Sons, Kirkintilloch	140	—
‡‡Carraghgour	Dublin Dockyard Co., Dublin	350	—
‡‡Alfred Colebrooke	Scott & Sons, Bowling	140	—
‡‡Mango	John Fullerton & Co., Paisley	400	—
		1030	
WORK ON HAND—			
‡‡Not yet named	Wm. Chalmers & Co., Rutherglen	100	—
† „ „	Scott & Sons, Bowling	380	—
† „ „	Scott & Sons, Bowling	380	—
		860	

Gauldie, Gillespie & Co., Glasgow.

‡‡Kopoola	Geo. Brown & Co.	230	—
‡‡Milhafre, Pathia, Senegal and Jacara	Scott & Sons	260ea	—
‡‡Zelia	Geo. Brown & Co.	450	—
‡‡Rattray Head	Scott & Sons	420	—
‡‡Aurelia G.	Geo. Brown & Co.	520	—

John G. Kincaid & Co., Ltd., Greenock.

† Vestalia and Valetta, cargo steamers	Russell & Co., Port Glasgow	3,300ea	—
† Ballorado, cargo steamer	„ „ „	2,700	—
† Queen Margaret, cargo steamer	R. Duncan & Co., Ltd., Port Glasgow	2,700	—
† Dundrennan, single-screw cargo steamer	Russell & Co., Port Glasgow	2,300	—
† Strathmore and Strathcarron, cargo steamers	Greenock & Grangemouth Dockyard Co., Ltd., Greenock	2,250ea	—
† River Orontes, single-screw cargo steamer	„ „ „	2,250	—
† Agnes Duncan, single-screw collier	R. Duncan & Co., Ltd., Port Glasgow	1,600	—
† Progress III., single-screw cargo steamer	Campbeltown Shipbuilding Co., Campbeltown	2,100	—
† Mosqueiro, twin-screw cargo and passenger steamer	Murdoch & Murray, Ltd., Port Glasgow	1,200	—
† Campania and Cara, cargo steamers	Campbeltown Shipbuilding Co., Campbeltown	950ea	—
Sundry Boiler Contracts	——	2,500	
	Total	30,250	

Menzies & Co., Leith.

* Uniflorons, drifter	Stephen, Banff	180	130

Miller & Macfie, Ltd., Glasgow.

Six sets of engines, 2,100 H.P.
Repairs have been done on fully 300 steamships and sailing ships.

WORK ON HAND—
Seven sets of engines.

Muir & Hauston, Ltd., Glasgow.

† T.S.S. Faquary	Mackie & Thomson, Ltd., Govan	1,450	180
† T.S.S. Jacuhy	„ „ „	1,450	180
† T.S.S. Adriatico	„ „ „	1,550	180
† T.S.S. Jonio	„ „ „	1,550	180
* S.S. Wheatlands	Dublin Dockyard Co.	730	130
† T.S.S. Itaquera	Mackie & Thomson, Ltd., Govan	2,000	180
† S.S. Wandana	„ „ „	1,200	180
	Total	9,930	

Rankine & Blackmore, Greenock.

† Saint Ursula, S.S.	Russell & Co.	2,800	180
† Saint Dunstan, S.S.	„ „ „	2,500	180
† Penang Maru, S.S.	„ „ „	3,100	180
† Muriston & Iriston, S.S.	Robt. Duncan & Co.	2,100ea	180ea
† Kirkoswald, S.S.	Archibald McMillan & Son	2,350	180
† Hera, S.S.	Greenock & Grangemouth Dock-Co., Ltd.	2,900	180
* Queen Empress	Murdoch & Murray, Ltd.	1,350	125
† Hawkhead, S.S.	Russell & Co.	2,500	180
† Den of Airlie, S.S.	„ „ „	3,300	180
	Total, I.H.P.	25,000	

James Ritchie, Partick.

* Shipped Abroad	Riley, Hargraves & Co., Ltd.	300	—
* Blaxland, twin-screw	Mackie & Thomson, Ltd.	450	—
* Shipped Abroad	United Engineering Co., Ltd.	300	—
* Shipped Abroad	„ „ „	300	—
* Shipped Abroad	„ „ „	240	—
* Shipped Abroad	Various	360	—
	Total	1,950	—

Several sets on hand which will keep them well employed for some time.

‡‡ Compound Surface Condensing. † Triple.
* Compound.

David Rowan & Co., Glasgow.

Name of Vessel.	Builders.	I.H.P.	Press. lbs.
† Margaret and St. Paul, single-screw	Campbeltown Shipbuilding Co.	950ea	—
† Baron Wemyss, single-screw	Dunlop, Bremner & Co., Ltd.	1,200	—
* Tambar, twin-screw	Greenock & Grangemouth Dockyard Co., Ltd.	675	—
a Maidan, single-screw	Wm. Hamilton & Co., Ltd.	4,800	—
† Jacatra, single-screw	„ „ „	3,200	—
† Samarinda, single-screw	„ „ „	4,750	—
† Dryden, single-screw	„ „ „	3,200	—
† Cairnhill, St. Hugo and St. Andrew, single-screw	Arch. McMillan & Son, Ltd.	2,700ea	—
* Coombar, twin-screw	Murdoch & Murray, Ltd.	675	—
† Saxon Monarch, single-screw	Napier & Miller, Ltd.	2,900	—
† Baron Jedburgh, single-screw	A. Rodger & Co.	3,100	—
a Ajana, twin-screw	Russell & Co.	5,250	—
† Frankmount, single-screw	„ „ „	2,950	—
a Infanta Isabel, twin-screw	„ „ „	7,500	—
† Niceto de Larrinaga, single-screw	„ „ „	2,500	—
	Total	52,700	

Also 22 Boilers for shipment—I.H.P. 11,300.

McKie & Baxter, Glasgow.

The output for the year is a total of 9,115 I.H.P. of marine machinery.

Speedwell Iron Works (W. W. Lidgerwood), Coatbridge.

† Taranaki and Ratapiko	J. Duthie, Torry, Aberdeen	500ea	180ea
† Adoration	„ „ „	280	180
† Petrel	„ „ „	600	180
† Lanner and Uberty	„ „ „	280ea	180ea
† Loch Tummel, Loch Morar and Vale of Endrick	„ „ „	500ea	180ea
† Runo and Iguape	Scott & Sons, Bowling	620ea	180ea
† Koning Albert	Mackie & Thomson, Ltd., Govan	450	180
† Ocean Reward	A. Hall & Co., Aberdeen	280	180
† S.S. 551	Cochrane & Sons, Selby	650	200
† S.S. 55	Montrose Shipbuilding Co.	300	180
	Total	6,860	
WORK ON HAND—			
6 sets Triples	Total	3,200	—

Ross & Duncan, Glasgow.

During the year 1912 Messrs. Ross & Duncan constructed and fitted on board screw vessels on the Clyde twelve sets of machinery aggregating 9,700 indicated horse-power, and shipped abroad twenty-five sets aggregating 5,720 indicated horse-power, making a total output for the year of thirty-seven sets of 15,420 I.H.P. In addition to the boilers for these sets, they constructed for home and abroad seven boilers of 2,250 I.H.P., and in hand there are at present twenty-two sets of machinery of 13,920 I.H.P.

IRISH.

The Dublin Dockyard Co., Ltd., Dublin.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
‡‡Carraghgour, hopper grab dredger	—	British	393	—	350
‡‡Dun Engus, pass., cattle and cargo	—	„	234	—	650
‡‡Wheatlands, cargo steamer	—	„	499	—	730
† Sligo, cattle and cargo	—	„	514	—	750

WORK ON HAND—
2 fast fishery cruisers, 3 cargo steamers, aggregating 2,750 tons.

Harland & Wolff, Ltd., Belfast.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
a Oxfordshire, twin-screw	Steel	British	8,624	—	5,450
a Desna, twin-screw	„	„	11,483	—	5,960
a Darro, twin-screw	„	„	11,484	—	5,960
a Drina, twin-screw	„	„	11,500app.	—	5,960
a Abosso, twin-screw	„	„	8,000app.	—	3,800
a Appam, twin-screw	„	„	8,000app.	—	3,800
rt Ceramic, triple-screw	„	„	18,500app.	—	8,370

The Larne Shipbuilding Co., Larne Harbour.

sc Armia	Steel	British	125	—	25
WORK ON HAND—					
m Motor lighter	Steel	—	—	—	40
m Motor lighter	„	—	—	—	15

† Triple. * Compound. *m* Motor.
a Quadruple. ‡‡ Compound Surface Condensing.
rt Reciprocating and Turbine. *sc* Surface Condensing.

Workman, Clark & Co., Ltd., Belfast.

Name of Vessel.	Builders.			I.H.P.	Press. lbs.
ta Vaulsin, steamer	Steel	British	10,421	—	7,000
tt Makarini, steamer	..	,,	10,624	—	5,200
† Demosthenes, steamer	..	,,	6,689	—	5,000
† Laomedon, steamer	..	,,	6,693	—	5,000
ta Vestris, steamer	..	,,	10,494	—	7,000
Caisson	..	,,	950	—	—
ta Pisaures, steamer	..	,,	7,780	—	7,500
tt Hawkes Bay, steamer	..	,,	10,650	—	5,200
a Kentucky, steamer	..	,,	6,580	—	3,500
tt Nestor, steamer	..	,,	14,500	—	8,000

All engined by same Company.

VESSELS ENGINED.

MacColl & Co., Ltd., Abercorn Basin, Belfast.

Name of Vessel.	Builders.	I.H.P.	Press. lbs.
† Sligo	Dublin Dockyard Co.	750	180

FRENCH.

Ateliers et Chantiers de France, Dunkirk.

Name of Vessel.	Built of	Owners.	G.T.	G.T. inclu. erect.	I.H.P.
† Saint Philippe, cargo-boat ..	—	French	3,716	—	1,300
† Saint Simon, cargo-boat ..	—	,,	3,716	—	1,300
Floating dock	—	,,	1,500	—	—
† Auguste Conseil, cargo-boat	—	,,	3,270	—	1,450
† Edouard Shaki, cargo-boat	—	,,	4,700	—	1,900
† Jeanne Marie, cargo-boat ..	—	,,	3,260	—	1,500
† Marguax, cargo-boat	—	,,	1,880	—	1,200
† Astrée, cargo-boat	—	,,	4,850	—	2,000
† Saint Barnabé, cargo-boat ..	—	,,	5,660	—	2,500

All engined by the same Company.

Baheux Freres, Boulogne-Sur-Mer.

* Yvonne, Saint Louis, Stella Maris, Adrienne, trawlers	Steel	French	102ea	—	200

Engines by Caillard & Co., Le Havre.

WORK ON HAND—					
† Afrique II., steel trawler ..	—	French	520	—	700
† Jean, steel trawler	—	,,	132	—	280
† Alice, steel trawler	—	,,	132	—	280

Chantiers de l'Atlantique, St. Nazaire.

t France, packet boat	—	French	23,666	—	45,000
† Mont. Viso, cargo-boat ..	—	,,	4,819	—	2,000
† Amiral Villaret de Joyeuse, cargo-boat	—	,,	5,927	—	4,000
† Amiral Fedé, cargo-boat ..	—	,,	5,980	—	3,660

Engines by same Company.

WORK ON HAND—					
† Antilles, packet boat	—	French	2,178	—	1,800
†*t* Lutetia, packet boat	—	,,	14,659	—	20,500
†*t* Flandre, packet boat	—	,,	8,578	—	10,500
† Préveza, Chio, Touragne Reize and Aidin Reize, gunboats	—	Turkish	dis.540ea	—	1,025ea

To be engined by same Company.

Chantiers de Normandie, Grand Quevilly, pres Rouen.

Radioléine, tanker	Steel	French	4,100	—	2,100
Mississipi, cargo-boat	,,	,,	7,000	—	3,900
Deborter, torpedo-boat destroyer	—	,,	—	—	—

Engines by Chantiers de l'Atlantique, St. Nazaire.

WORK ON HAND—					
Georgie, cargo-boat	Steel	French	7,000	—	3,900
m Motricine, tanker	,,	,,	4,000	—	1,700
Puerto Rico, packet boat, twin-screw	,,	,,	6,700	—	—
3 Cargo-boats	,,	,,	8,400ea	—	3,200ea

Engines to be by Chantiers de l'Atlantique, St. Nazaire.

Cie des Messageries Maritimes, La Ciotat.

WORK ON HAND—					
a Audie Lebon, packet-boat ..	—	French	13,500	—	11,000

Ste. Anon. des Chantiers et Ateliers de Provence, Port de Bouc.

† Duc D'Amale, twin-screw, 1st-class pass. steamer ..	—	French	5,500	—	6,600
† Moda, Kadi Keny, and Bourgas, 1st-class pass. steamers	—	Turkish	800ea	—	1,200ea
† Afrique, ferry steamer ..	—	Egyptian	300	—	400
12 Barges	—	French	200	—	—
Dock Caisson, for dry docks	—	..	500	—	—

Engines by same Company.

WORK ON HAND—

1 Atlantic Steamer, turbine quadruple, 18,000 tons; 1 1st-class passenger twin-screw steamer, 8,000 tons; 1 screw steamer transport for the French Government, and several small river steamers, tugs, etc. All the stocks are full up.

Ste. des Forges et Chantiers de la Mediterranee, Le Havre.

t Rouen, packet boat	—	French	1,679	—	8,000
Ville d'Alger, cargo-boat ..	—	,,	5,150	—	1,640
Adjame, paddle	—	,,	120	—	—
Le Havre (lightship) and La Heve (paddle)	—	—	443ea	—	150ea
Dourak Réis and Hizir Réis, gunboats	—	—	420ea	—	850ea

Engines by same Company.

ta Twin Quadruple. *tt* Twin Triple. † Triple Expansion. * Compound.
†*t* Triple Expansion and Turbines. *m* Motors. *a* Quadruple. *t* Turbines.

BELGIAN.

Antwerp Engineering Co., late Chantiers Navals Anversois, Hoboken.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect	I.H.P.
† Narcis, single-screw	Steel	Belgian	3,589	4,500	1,950
† Beechtree, single-screw ..	,,	British	1,276	1,276	1,093
† Victoria and Hispania, single-screw	,,	German	1,251ea	1,800ea	1,125ea
† Eleanor, single-screw	,,	British	1,276	1,276	800
† Modemi, single-screw	,,	,,	1,390	1,390	1,100

Engines by English firms.

WORK ON HAND—

1 Patent Coaling Barge, Clarke's.
2 Shelter-deck Steamers, Isherwood principle, abt. 8,000 tons d.w. each.
1 Raised Quarter-deck Steamer of 1,450 tons.
1 Raised Quarter-deck Steamer of 2,000 do.
1 Patent Self-trimming Collier (this Company's patent).

Ste. Anon John Cockerill a Seraing, Chantier Naval de Hoboken.

* Roi Albert and Reine Elisabeth Transports ..	Steel	Congo	430ea	—	—
† Comte de Flandre and Princesse Marie José ..	,,	,,	130ea	—	—
a Albertville	,,	Belgian	75	—	—
m Comorim trawler	,,	Brazil	70	—	—
Stern-Wheel steamer ..	,,	Congo	29	—	—
* 2 Mud Lighters	,,	Russia	760	—	—
* Steam ballast dredger ..	,,	Eseaut	500	—	—
3 Barges	,,	Congo	500	—	—
Decked Lighter	,,	Rio Grande	450	—	—

Lighters, canoes and 47 whale boats of different dimensions.

Aug. Hamman, Ostend.

de Godsgenade, 0.79, dandy cutter	—	Belgian	65	—	12
ma Le Roi Albert B., dandy cutter	—	,,	40	—	—
ma Pilot-boat Anvers No. 3, schooner	—	,,	120	—	—
WORK ON HAND—					
ma Not yet designed, dandy cutter	—	Belgian	40	—	—
de Not yet designed, dandy cutter	—	,,	65	—	—

GERMAN.

Actien-Gesellschaft "Weser" Bremen.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
m Primus, cargo ship	Steel	German	4,000	—	1,600
a Kandelfels, cargo steamer	—	,,	5,730	—	2,500
† Gundomar, cargo steamer ..	—	,,	3,786	—	2,200
† Neptun and Mercur, cargo steamers	—	,,	662ea	—	350ea
a Roland, cargo steamer ..	—	,,	7,000	—	4,000
† Huberfels, cargo steamer ..	—	,,	6,000	—	2,500
WORK ON HAND—					
m Schlepp, tug	Steel	German	100	—	—
† Huberfels and Lauterfels, cargo steamers	—	,,	6,000ea	—	2,500ea
a No. 193, Pass. and cargo st.	—	,,	20,000	—	14,000
† Spitzfels, cargo steamer ..	—	,,	6,000	—	2,500
† Nos. 195 and 196, cargo stms.	—	,,	680ea	—	350ea
No. 197	—	,,	—	—	—
† Nos. 198 and 199, cargo stms.	—	,,	6,000ea	—	2,500ea
a No. 200, cargo steamer ..	—	,,	7,000	—	4,000
† Nos. 201, 202 and 203, cargo steamers	—	,,	6,000ea	—	2,500ea
† No. 204, cargo steamer ..	—	,,	5,000	—	2,200
No. 186	—	,,	—	—	—
m Priemus, cargo ship	—	,,	4,000	—	1,600

All engines by same establishment.

Actien-Gesellschaft "Neptun," Rostock.

† Portici, 1-decker, wing poop	Iron	German	1,754	—	1,100
† Lugo, 2-decker	,,	,,	3,673	—	2,100
† Bochimi, 2-decker	,,	,,	6,161	—	3,600
† Rolmar, 2-decker	,,	,,	6,184	—	3,600
† Portofino, 1-decker, wing poop	,,	,,	1,754	—	1,100
† Amalfi, ,, ,,	,,	,,	1,756	—	1,100
† Marsala, ,, ,,	,,	,,	1,755	—	1,100

Engines by same establishment.

Blohm & Voss, Hamburg.

Tabora, tw.-sc. pass.	Steel	German	8,022	—	4,800
Seydlitz, battleship-cruiser	—	German Gov.	—	—	—
WORK ON HAND—					
2 Battleship cruisers	—	German Gov.	—	—	—
1 Floating dock	—	,,	—	—	—
o 2 Cargo boats	—	—	—	—	—
t 2 Atlantic liners	—	German Gov.	—	—	—
†*t* 1 Triple-sc. pass. steamer ..	—	,,	—	—	—

† Triple Expansion. * Compound. *a* Quadruple. *m* Motor.
de Donkey Engine. *ma* Motor Auxiliary. *o* Oil.
t Turbines. †*t* Triple Expansion and Turbines.

Mr. Heinrich Brandenburg, Hamburg.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inch. erect.	I.H.P.
* Pilot steamer	Steel	Germany	—	38	150
* 1 Launch	,,	,,	—	20	60
* 10 Launches	Wood	Eng. & Belgian	—	total 28	total 72
* Chrysander, Schlinter and Sloman, pass. steamers	Steel	German	—	76ea	220ea
* Valdivia, fire-boat	,,	Valdivia	—	36	60

Engines by same establishment.

WORK ON HAND—					
Lighter	Steel	Germany	—	450	—

Bremer Vulkan, Vegesack.

†	Frankfurt and Heidelberg, cargo steamers	—	Germany	1,662ea	—	1,700ea
a	Wasgenwald, pass. & cargo	—	,,	4,708	—	3,500
†	Buenos Aires, pass. & cargo	—	,,	9,155	—	4,500
†	Elsass, cargo steamer	—	,,	8,265	—	4,300
†	Rheinland, cargo steamer	—	,,	8,262	—	4,300
a	Renata Amsinck, cargo str.	—	,,	4,429	—	2,200
a	Elisabeth Brock, cargo str.	—	,,	4,284	—	2,200
†	Sierre Ventana, pass. and cargo	—	,,	8,500	—	4,500
†	Sierra Salvada, pass. and cargo	—	,,	8,500	—	4,500
†	Rappenfels, cargo steamer	—	,,	6,750	—	3,000

Engines by same establishment.

	WORK ON HAND—					
†	Building No. 562, pass. and cargo	—	Germany	9,180	—	4,500
†	Building Nos. 563 and 564, cargo steamers	—	,,	8,265ea	—	4,300ea
a	Java, cargo steamer	—	,,	9,270	—	5,000
†	Building No. 566	—	,,	1,050	—	600
†	Building Nos. 567 and 568, cargo steamers	—	,,	9,380ea	—	4,000ea
†	Building Nos. 569, 570, 571 and 572, cargo steamers	—	,,	8,265ea	—	4,300ea
†	Building Nos. 573 and 574, pass. and cargo	—	,,	6,900ea	—	2,300ea

Engines by same establishment.

Deutsch-Luxemburgische Bergswerks und Hutten-Aktiengesellschaft, Emden.

No. 1, Cargo-boat	Iron	German	730	—	—
Nos. 2, 3, 5, 6 and 47, Pontoons	—	,,	—	—	—
No. 4, Coal barge	—	,,	250	—	—
No. 7, 12 Stemmtore	—	—	—	—	—
Nos. 8 and 9, Torpedo transports	—	German	—	—	—
Nos. 10, 17, 29, 36, 37, 46 and 47, Floating caissons	—	—	—	—	—
No. 18, Pilot schooner	—	German	—	—	—
Nos. 19 and 27, Cargo-boats	—	,,	—	—	—
No. 28, Floating crane	—	,,	—	—	—

Flensburger Schiffsbau Gesellschaft.

Ophelia, S.S.	Steel	Germany	1,153	—	650
Viola, S.S.	,,	,,	1,156	—	650
Santa Rosa, S.S.	,,	,,	3,797	—	1,300
2 Floating docks	,,	,,	total 16,000	—	—
Prussia, S.S.	,,	,,	3,557	—	2,200
Palatia, S.S.	,,	,,	3,558	—	2,200
Hobart, S.S.	,,	,,	5,923	—	4,000
Ramses, S.S.	,,	,,	b 7,128	—	3,600
Stolberg, S.S.	,,	,,	5,900	—	4,000
Aussa, S.S.	,,	,,	7,485	—	4,500
WORK ON HAND—					
Alrich, S.S.	Steel	Germany	6,600	—	3,650
Cannstatt, S.S.	,,	,,	5,900	—	4,000
2 Floating docks	,,	,,	total 15,500	—	—
Wachtfels, S.S.	,,	,,	5,800	—	2,800
Tasmania and Sumatra, S.S.	,,	,,	7,300ea	—	4,500ea
S.S. Building No. 334	,,	,,	5,800	—	2,800
S.S. Building Nos. 335 & 336	,,	,,	3,560ea	—	2,200ea
S.S. Building Nos. 337	,,	,,	7,130	—	3,600
Gera, S.S.	,,	,,	4,750	—	3,000
S.S. No. 339	,,	,,	7,130	—	3,600

J. Frerichs A-G.

Einswarden a.d. Unterweser :—

a	Wigbert, cargo steamer	Iron	German	—	3,367	2,000
†	Pilot steamer	—	,,	—	400	900
m	Wotan, lugger	Iron	,,	—	138	130
	WORK ON HAND—					
†	Steam trawler	Iron	German	—	247	360
m	Tanker	,,	Roumanian	—	3,090	2,000
a	2 Cargo-boats	,,	—	—	5,800ea	3,200ea
m	Tanker	,,	English	—	5,300	3 600

Engines by same establishment.

Kleinsshiffbau Osterholz-Scharmbeck :—

Cattle boat	—	Columbia	—	120	60
m 5 Motor tugs	—	Brazil	—	75ea	60ea
Coasting sailer	—	Elsbeth	—	80	—
Cargo and cattle S.S.	—	Columbia	—	450	300
4 Cattle boats	—	,,	—	150	—
Suction dredger	—	—	—	90	20

Engines for 4th and last vessels by same establishment.

WORK ON HAND—					
Cattle-boat	—	Columbia	—	120	—
m Ferry-boat	—	German	—	75	12
Harbour boat	—	,,	—	50	—

† Triple Expansion. * Compound. m Motor. a Quadruple.

J. G. Hitzler, Lauenburg (Elbe).

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inch. erect.	I.H.P.
25 Vessels, including lighters, motor-boats and tugs, cargo and ferry-boats	Steel	—	—	—	—
WORK ON HAND—					
16 Motor-boats	Steel	—	—	—	—
1 Cargo steamer	—	—	—	—	250
1 Cargo-boat	—	—	—	—	—
11 other vessels and 1 ferry	Steel	—	—		

R. Holtz, Harburg and Hamburg.

Steam-boat	Steel	Abroad	255	—	967
Motor-boat	,,	,,	161	—	449
Lighter	,,	,,	47	—	—
Steam-boat	Wood	,,	28	—	84
Steam-boat	Steel	German	37	—	96
Motor-boat	,,	,,	65	—	112

And 11 other small boats, Wood and Steel.

WORK ON HAND—					
Steam-boat	Steel	Abroad	144	—	368
Motor-boat	,,	,,	14	—	52
Steam-boat	Wood	German	14	—	24
Lighter	Steel	,,	95	—	—

J. W. Klawitter, Danzig.

3 Survey boats	Steel	German	69ea	—	135ea
Falke and Schwan, pass. strs.	,,	,,	132ea	—	155ea
6 Dredgers	,,	,,	208ea	—	—
Karl, motor-boat	,,	,,	3	—	10
Stor, stern-wheel steamer	,,	,,	118	—	198
2 Coal barges	,,	,,	236ea	—	—

Engines by same establishment.

WORK ON HAND—					
Steel Dredger	Steel	German	234	—	—

Werft von D. W. Kremer Sohn, Elmshorn.

Sea lighter	Steel				
Motor tug	,,				
* Steam launch	Wood				
8 Barges	—	German and			
5 Motor-boats	Wood	abroad	total 465	—	—
10 Rowing boats	or				
11 other small boats	Steel				
WORK ON HAND—					
2 Barges	Steel	—	125	—	—
3 mast Schooner	,,	—	—	—	—
4 other boats	—	—	—	—	—

Fried. Krupp Aktiengesellschaft Germaniawerft, Kiel-Gaarden.

Hagen, motor tank ship		Foreign	5,810	—	2,300
WORK ON HAND—					
Vessel S 187, motor tank ship	—	Foreign	5,810	—	2,300
Vessel S 188, motor tank ship	—	,,	7,900	—	3,500

All engines built by the same establishment.
Warships have been built, but particulars are not available.

C. Luhring, Brake, Oldenburg.

m	Seeadler, schooner	Steel	German	73	—	20
	Prahm, barque	—	,,	40	—	—
m	Fimmo, schooner	Steel	,,	268	—	80
†	Adler, cargo steamer	,,	,,	371	—	350
	2 Lighters	,,	,,	285ea	—	—
	WORK ON HAND—					
	Lighter	Steel	German	285	—	—
m	Drifter	,,	,,	136	—	40
	No. 126, Schooner	,,	,,	130	—	—
	Lighter	,,	,,	370	—	—
m	Schooner	,,	,,	290	—	90

J. L. Meyer, Papenburg.

*	Fasmund, lightship	Steel	German and abroad	181	—	100
†	Yard No. 277, Tug	Wood	,,	25	—	250
*	2 Tugs	Steel	,,	70ea	—	200ea
*	Albatros, pass. steamer	,,	,,	215	—	260
	Selene and Stella, lighters	,,	,,	260ea	—	—
	2 Barges	,,	,,	58ea	—	—
m	Utag II., motor-boat	,,	,,	17	—	75
*	Dredger VII., dredger	,,	,,	40	—	15

Engines by same establishment.

WORK ON HAND—					
8 Tugs, 3 Steam launches	—	—	total 167	—	total 4,235

Reiherstieg Schiffswerfte und Maschinenfabrik, Hamburg.

†	Bahia Blanca, pass. and cargo steamer	Steel	German	9,349	9,349	3,500
a	Professor Woermann, pass. and cargo steamer	,,	,,	6,061	6,061	3,700

Engines by same Company.

WORK ON HAND—					
† No. 446, pass. and cargo steamer	Steel	German	—	abt. 10,000	3,500
m No. 447, Motor-vessel for petroleum	—	,,	—	abt. 6,200	2,000 B.H.P.
* No. 449, Cargo steamer	—	,,	—	abt. 400	I.H.P.

Engines by same Company.

† Triple Expansion. * Compound. m Motor. a Quadruple.

Rickmers, Rusmuhlen, Rhederei & Schiffbau A.-G., Bremerhaven.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
Kurmark, cargo steamer	Steel	German	5,147	—	2,500
Dermidje, cargo steamer	,,	,,	3,760	—	1,800
WORK ON HAND—					
Cargo steamers Nos. 163, 166 and 167	Steel	German	5,147ea	—	2,500ea
Cargo steamer No. 165	,,	,,	3,760	—	1,800

Gebr. Sachsenberg A.-G., Rosslau.

*	Kaiser Wilhelm II., paddle-boat	Steel	German	555	—	1,250
*	Blücher, paddle-boat	,,	,,	570	—	1,250
	6 Barges	,,	,, total	307	—	—
	Humburg, 2 screws	,,	,,	241	—	520
†	Wasserfahrzeug, water-tank steamer	,,	,,	537	—	600
	Nos. 692 and 693, Dredgers	,,	,, total	280	—	450
*	Cochabamba, stern-wheel	,,	,,	44	—	50
	6 Pontoons	,,	,, total	142	—	—
*	Lenthant, 2 screw	,,	,,	310	—	500
	Engines built by same firm.					
	WORK ON HAND—					
†	2 Paddle tugs	Steel	German	1,240	—	2,050
†	2 Screw tugs	,,	,,	1,290	—	2,200
	No. 705, Pontoon	,,	Nikolajew	725	—	—
m	Nos. 707, 710 and 711, screws	,,	German	205	—	125
*	D. Pedro, paddle-tug	,,	Porto-Alegre	90	—	75
*	No. 709, Paddle-boat	,,	Cöln	635	—	700
*	No. 712, 2 screws	,,	Herne	125	—	120
†	No. 713, Trawler	,,	Hamburg	650	—	400
	To be engined by same firm.					

F. Schichau, Elbing and Danzig.

Ships built: Gross reg. tons, 39,600; I.H.P., 162,700.

WORK ON HAND—
Ships in course of building:—Gross reg. tons, 131,380: I.H.P., 717,600

Schiffswerft von Henry Koch A.-G., Lubeck.

†	Centa, screw steamer	Steel	German	—	2,242	1,100
†	Newa, screw steamer	,,	,,	—	916	600
†	Horncap, screw steamer	,,	,,	—	4,336	2,000
†	Titania, screw steamer	,,	,,	—	1,281	850
†	Zanzibar, screw steamer	,,	,,	—	1,617	900
†	Kabat, screw steamer	,,	,,	—	2,245	1,100
†	Tetuan, screw steamer	,,	,,	—	2 243	1,100
	WORK ON HAND					
†	Screw Steamer No. 218	Steel	German	—	925	600
†	Screw Steamers Nos. 219 and 220	,,	,,	—	1,625ea	850ea
†	Screw Steamers Nos. 221 and 222	,,	,,	—	4,650ea	2,000ea

Stettiner Oderwerke, Stettin.

*	Stettin II., bucket dredger	Steel	German	193	—	90
†	2 Dredgers	,,	,,	230ea	—	350ea
†	Prinzessin Sophie Charlotte, cargo and pass. str.	,,	,,	1,543	—	1,100
†	Dredger (suction)	,,	,,	960	—	1,200
*	Möwe, cargo steamer	,,	,,	300	—	300
†	Johanna Oelssner, cargo str.	,,	,,	1,426	—	950
†	Wandraha, cargo steamer	,,	,,	1,520	—	750
†	Johanna, cargo steamer	,,	,,	860	—	650
*	Dollart and Jade, cargo strs.	,,	,,	534ea	—	350ea
	Engines by same establishment.					
	WORK ON HAND—					
†	Building Nos. 638 and 639, cargo and pass. strs.	Steel	German	1,300ea	—	1,250ea
†	Building No. 642, cargo str.	,,	,,	1,458	—	700
†	Building No. 643, cargo str.	,,	,,	2,800	—	1,650
†	Building No. 644, pass. str.	,,	,,	1,660	—	3,200
†	Building No. 645, cargo str.	,,	,,	1,520	—	750
	Engines by same establishment.					

Joh. C. Tecklenborg, A.-G., Geestemunde.

†	Karnak and Hathor	Steel	German	9,000ea	—	4,000ea
†	Düsseldorf and Essen	,,	,,	7,600ea	—	3,700ea
a	Sturmfels	,,	,,	6,500	—	3,000
	Rolandseck, motor-ship, (engines, Tecklenborg-Carels type)	,,	,,	2,600	—	2,000
†	Lüneburg	,,	,,	7,600	—	3,700
	Steam trawler (engines only)	—	—	—	—	1,050
	Engines by same establishment.					
	WORK ON HAND—					
a	Alda	Steel	German	8,500	—	3,800
†	Memphis and Menes	,,	,,	9,000ea	—	4,000ea
†	Sofels	,,	,,	6,700	—	3,000
†‡	Building No. 256	,,	,,	21,000	—	18,000
†	Building No. 257	,,	,,	9,000	—	4,000
†	Building Nos. 258 and 259	,,	,,	5,000ea	—	3,400ea
†	Building No. 260	,,	Denmark	6,700	—	2,600
†	Building No. 261	,,	German	7,600	—	4,000
†	Building No. 262	,,	,,	9,000	—	4,000
	Engines by same establishment.					

Mr. G. H. Thyen, Brake, Oldenburg.

*	Harle, ferry steamer	Steel	German	67	—	110
	Hansafahrt, motor lighter	,,	,,	49	—	—
	Oldenburg I., barge	,,	,,	40	—	—
	WORK ON HAND—					
	2 Barges	—	—	—	—	—

* Compound. † Triple Expansion. *m* Motor. *a* Quadruple.
‡† Triple Expansion and Turbine.

Union-Giesserei, formerly Gustav Fechter, Konigsberg.

	Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
*	Guste	Steel	German	100	—	190
m	Der Preusse	,,	,,	200	—	90
*	Kneiphof	,,	,,	16	—	75
	Plock	,,	,,	68	—	—
m	Hilda und Nixe	,,	,,	106a	—	35ea
	Union	,,	,,	460	—	—
m	Plick and Oppermann	,,	,,	5ea	—	20ea
*	Svedana	,,	,,	50	—	150
	Engines by same establishment					
	WORK ON HAND					
*	Building No. 166	Steel	German	60	—	200
*	Building No. 167	,,	,,	150	—	280
*	Building No. 168	,,	,,	180	—	—
*	Building No. 169	,,	,,	5	—	—
	Engines by same establishment.					

Vulcan-Werke, Stettin and Hamburg.

t	Nes. Geoet and Keravnos, torpedo-boats	Steel	Greece	—	510ea	16,800ea
†	Prinz Eitel Friedrich, cargo pass. str.	,,	German	1,525	—	1,100
†	2 Barge-boats	,,	,,	532ea	—	640ea
*	Wilhelm Albert, tug-boat	,,	,,	60	—	150
*	Bleibtreu, tug-boat	,,	,,	70	—	220
†	Sierra Nevada, pass. and cargo	,,	,,	7,950	—	4,200
t	Breslau, protected cruiser	—	,,	—	—	—
t	4 Torpedo-boats	,,	,,			
	Floating dock, of 25,000 tons lifting power	Steel	,,			
	Friedrich der Grosse, battleship	,,	,,	—		
	Engines by same establishments.					
	WORK ON HAND Two yards.					
t	2 Torpedo-boats	Steel	Germany	—	510ea	16,800ea
†	Pass. and cargo st.	,,	Denmark	11,700	—	10,000
t	Pass. and cargo st.	,,	Germany	21,600	—	15,600
†	Sierra Cordoba, pass. and cargo st.	,,	,,	7,950	—	4,200
	6 Torpedo-boats	,,	Greece	—	139ea	2,400ea
t	Battle-cruiser	,,	,,	8,100	—	24,000
	Ice-breaker	,,	Russian	—	—	4,500
	Pass. st.	,,	German	1,750	—	5,400
t	Imperator, pass. st.	,,	,,	52,000	—	54,500
	Cap Trafalgar, pass. and cargo	,,	,,	18,000	—	15,900
	Battleship	,,	,,	—	—	—
	Engines by same establishments.					

Caeser Wolheim, Breslau.

	26 Vessels	Various C'tries		9,886	—	—
	WORK ON HAND—					
	27 Vessels	—	—	—	—	—

AUSTRIAN.

Cantiere Navale Triestino, Monfalcone.

	Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
*	Tender B., tug	Steel	Austrian	—	32	150
*	Liqueni, pass. vessel	—	Turkish	—	210	230
†	Lucia, cargo vessel	Steel	Austrian	—	6,744	2,700
†	Laconia, cargo vessel	,,	,,	—	6,333	2,700
†	Perla and Ambra, cargo vessels	,,	,,	—	5,355ea	2,500ea
t	Svida, arm. cruiser	—	—	3,500dis.	—	25,000
	Idra and Triglia, barges	Steel	Argentina	—	90ea	—
	Nos. 37 and 38, barges	,,	Austrian	—	90ea	—
	WORK ON HAND—					
ta	No. 39, Atlantic liner	—	Austrian	—	abt. 14,000	12,000
†	No. 34, Atlantic liner	—	,,	—	abt. 8,000	3,500
†	No. 40, cargo steamer	—	,,	—	abt. 5,355	2,500
†	No. 41, Cargo steamer	—	,,	—	abt. 6,744	2,700
	4 Barges	—	,,	—	abt. 90ea	—
†	No. 46, Cargo steamer	—	,,	—	abt. 6,000	2,700
†	Nos. 47 and 48, Cargo strs.	—	,,	—	abt. 6,700ea	abt. 2,700ea
	4 Barges	—	,,	—	abt. 90ea	—
†	No. 53, Cargo steamer	—	,,	—	abt. 6,700	2,700
†	No. 54, Tug-boat	—	,,	—	abt. 300	650

Marco W. Martinolics, Lussinpiccolo.

	Brioni	—	Austrian	—	120	350
	Almadi and Füred	—	,,	—	260ea	600ea
	Zrmanja and Velebit, cargo and passenger	—	,,	—	130ea	240ea
	WORK ON HAND—					
	No. 167, Cargo and pass.	—	Austrian	—	280	400
	No. 168, Cargo and pass.	—	,,	—	320	680
	Light tender, etc.	—	Austrian Gov.	—	500	450

Stabilimento Tecnico, Triestino.

	Viribus Unitis, Battleship	—	—	dis. 20,000	—	25,000
	Lung Tuan, Torpedo-boat destroyer	—	—	dis. 400	—	6,000
	San Marco, Tugboat	—	—	dis. 53	—	200
	WORK ON HAND—					
	Tegetthoff, Battleship	—	—	dis. 20,000	—	25,000
	Prinz Eugen, Battleship	—	—	dis. 20,000	—	25,000
	8 first-class Torpedo-boats	—	—	dis. 250ea	—	5,000ea
	1 Floating Crane of 150 tons lifting power.					
	1 Cargo steamer	—	—	t.d.w. 9,000	—	2,700

* Compound. *m* Motor. *ta* Twin Quadruple. † Triple. *t* Turbine.

THE NETHERLANDS.

The Arnhem Co., Arnhem.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
† Concordia 9, cargo-bt.	—	Dutch	150	—	150
† 2 Tugs	—	,,	70ea	—	100ea
* Noviomagum, dredger	—	,,	330	—	250
† Eendracht 8, tug	—	,,	60	—	80
* Sophie, tug	—	,,	80	—	100
* M.O.P. 124, ferry-bt.	—	Argentine	80	—	45
† Le Sanglier, tug	—	,,	150	—	275
† Vliestroom, pilot vessel	—	Dutch Gov.	100	—	75
† Dredger	—	Dutch	450	—	500
† Hasña I., tug	—	German	165	—	275
† Gerhard V., tug	—	,,	120	—	165
† Alelda Johanna II., tug	—	Dutch	240	—	475
† Thérésa, tug	—	Belgian	—	—	275
† De Maasnymph, pass.	—	Dutch	—	—	185
* Dinant, cargo	—	Belgian	—	—	150

Engines by same establishment (last 3 engines only).

WORK ON HAND—

Edmond Henriette, tug	—	Dutch	220	—	400
○ Elevator	—	,,	100	—	25
* Elise 5, dredger	—	,,	330	—	150
† Johannes III., tug	—	,,	110	—	135
† No. 133, tug	—	,,	80	—	100
* 6 sets of Engines	—	—	—	—	1,000

Engines by same establishment.

H. H. Bodewes, Millingen.

Rhenonia 10	Steel	German	—	1,495	—
Rheinkrone	,,	,,	—	1,498	—
Rheinpfalz	,,	,,	—	990	—
Maria II.	,,	,,	—	1,150	—

WORK ON HAND—

1 Vessel	Steel	German	—	850	—
1 Vessel	,,	Dutch	—	1,498	—
2 Vessels	,,	German	—	700ea	—
1 Vessel	,,	,,	—	600	—

G. & H. Bodewes, Hoogerzand.

11 Sailing vessels	—	German	1,180	—	—
m 1 Schooner	—	Dutch	300	—	—
m 1 Schooner	—	Danish	450	—	—
† 1 Sct. tug	—	Dutch	—	—	—

WORK ON HAND—

4 Sailing vessels	—	German	555	—	—
2 Steam tugs	—	Sth. America	—	—	—
* 1 Vessel	—	German	120	—	—
1 Steam tug	—	,,	—	—	—

Bonn & Mees, Rotterdam.

* Nitty	Steel	Dutch	50	—	60
* Willy	,,	,,	60	—	60
m Hermine	,,	,,	80	—	55
Nederlander	,,	,,	400	—	—
† Dredger	,,	Buenos Aires	3,000	—	1,200
Small craft	,,	,,	245	—	—

WORK ON HAND—

Madiven	Steel	Dutch	7,000	—	4,000
Marie Thérese	,,	French	260	—	500

Gebroeders Boot, Leiderdorp.

47 Barges	—	—total	12,175	—	—
2 Passenger steamers	—	— total	150	—	—
1 Tug-boat	—	—	25	—	—
8 Herring-luggers	—	total	800	—	—

D. Goedkoop, Jr., Amsterdam.

	Wood or Steel	Home and Foreign			
17 Motor launches			—	—	—
10 Motor barges	,,	,,	—	—	—
1 Steam launch	,,	,,	—	—	—
4 Motor tug-boats	,,	,,	—	—	—
1 Motor racing boat	—	—	—	—	—

WORK ON HAND—

6 Motor launches	—	—	—	—	—
1 Motor tug	—	—	—	—	—
1 Motor pass. vessel	—	—	—	—	—
3 Motor barges	—	—	—	—	—
1 Steam launch	—	—	—	—	—

De Groot & Looyen, Gorinchem.

1 Tug	—	Dutch	—	—	—
5 Skiffs	—	,,	—	—	—
2 Dredgers	—	,,	75ea	—	—
2 Lighters	—	Belgian	325ea	—	—
4 Boats	—	German	—	—	—
3 Elevators	—	Dutch	80ea	—	—

WORK ON HAND—

1 Lighter	—	Belgian	525	—	—
2 Skiffs	—	Dutch	—	—	—
2 Dredgers	—	,,	80ea	—	—
2 Lighters	—	,,	—	—	—

Jonker, Gebr., Alblasserdam.

Maria, motor-boat	—	Indra	—	60 d.w.	30
8 Lighters	Steel	Foreign	—	110ea	—
Liberté and Papillons, tugs	—	,,	—	—	180ea
Fourni, tug	—	,,	—	—	150
Hopper barge	—	,,	—	140	—
6 Lighters	Steel	Belgian	—	550ea	—
2 Lighters	,,	Foreign	—	130ea	—
Anna, tug	—	Holland	—	—	120
Tanklighter	—	Foreign	900	—	—

WORK ON HAND—

4 Lighters	—	—	—	3,000d.w.	—
1 Lighter	—	—	—	900d.w.	—

† Triple. * Compound. *o* Oil. *m* Motor.

Maatschappij voor Scheeps-en Werktuigbouw "Fijenoord," Rotterdam.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
† V. Overstraten, pass. str.	Steel	Dutch	4,482	—	3,150
† Krakatau, cargo-bt.	,,	,,	6,550	—	4,150
† Schouten and De Weert, pass. strs.	,,	,,	1,775ea	—	1,100ea
† Charon (later named Jason), boilers and engines only	—	,,	—	—	1,700
† Fauna and Fortuna (boilers and engines only)	—	,,	—	—	900ea

WORK ON HAND—

† Fos and Panter	Steel	Dutch	—	—	8,500ea
a Kon. Emma, pass. str.	,,	,,	7,300	—	6,000
† Melchior Treub, pass. str.	,,	,,	3,000	—	3,500
† Van Lansberge, pass. str.	,,	,,	1,800	—	1,225
† G 15 and G16, T.B.	,,	,,	—	—	3,000ea
† Sloet v.d Beele, pass. str.	,,	,,	3,000	—	1,660
† Texelstroom, cargo-boat	,,	,,	1,880	—	1,200
† Tarakan, engines and boilers only	,,	,,	—	—	1,000
† Medea, engines and boilers only	,,	,,	—	—	900
† Van Rees, engines and boilers only	,,	,,	—	—	1,660

N. V. Machinefabrik, Delfshaven.

14 Tugboats	—	Home and abroad	total 327	— total 8310
WORK ON HAND—		Home and		
6 Tug-boats	—	abroad	—	— total 785

J. Meyers' Shipbuilding Co., Zalt Bommel.

25 Vessels	—	—	tot. 9,385

WORK ON HAND—

3 Vessels.

B. A. Mittendorf, Avereest-Dedemsvaart.

Sailing yacht	Steel	Dutch	—	—	—
2 Sailers	,,	,,	403	—	—
2 Surf letter boats	,,	,,	150	—	—
Sailing clipper	,,	,,	175	—	—
Cargo-boat	,,	,,	60	—	—

WORK ON HAND—

Sailer	Steel	Dutch	220	—	—
Motor-boat	,,	,,	60	—	—
2 Cargo-boats	,,	,,	50	—	—

Nederlandsche Scheepsbouw-Maatschappij, Amsterdam.

m Juno	Steel	—	2,345	—	1,250
m Emanuel Nobel	,,	—	4,812	—	2,500
† Gouv. Gen. Idenburg	,,	—	1,312	—	1,000
‡‡Singkawang and Singapore	,,	—	589ea	—	425ea
†*m* Alkmaar	,,	—	72	—	275

WORK ON HAND—

† Dry-dock	Steel	Java	14,000 lifting power		—
† Pr. der Nederlanden	,,	—	9,200	—	6,000
† Houtman	,,	—	4,800	—	3,500
Van Neck	,,	—	3,000	—	1,800
m Artemis and Eburna	,,	—	4,500ea	—	1,800ea
† Rotti	,,	—	7,700	—	5,250

J. J. Pattje & Son, Waterhuizen.

Susi, schooner	Steel	German	270	—	—
m Gerhard	,,	,,	197	—	90
Senator Dantziger, schooner	,,	,,	164	—	—

WORK ON HAND—

2 Schooners	Steel	—	120ea	—	—

The Royal "Schelde" Shipbuilding & Engineering Co., Flushing.

m No. 138, Submarine	—	Dutch Gov.	147	—	445
† Lynx and Hermelyn, T.B.D.'s	—	,,	467ea	—	8,300ea
† Pontianak and Soerakarta, cargo steamers	—	Dutch	7,000ea	—	3,750ea
† Randwijk (cargo steamer, Gelderland (engines only)	—	—	—	—	1,200
	—	—	—	—	1,000

WORK ON HAND—

m 3 Submarines	—	Dutch Gov.	674	—	3,190
† 2 Torpedo-boats	—	,,	180ea	—	3,000ea
† Insulinde, mail steamer	—	Dutch	9,000	—	7,000
Madiven, cargo steamer (engines only)	—	—	—	—	3,500
Atalanta, cargo steamer (engines only)	—	—	—	—	1,200
No. 301, cargo steamer (engines only)	—	—	—	—	1,000

All engines except motors by same establishment.

J. & K. Smits Scheepswerven, Kinderdijk.

† Beverwijk VII., cutter-dredger	Steel	Russian	—	512	1,100
† Schonwen and Noord-Beveland, pass., S.S.	—	Dutch	—	275ea	375ea
† Kinderdijk and Krimpen, hoppers	—	Italy	—	745ea	450ea
* Coal elevator	—	Dutch	—	375	400
* Charlois, tug-boat	—	,,	—	73	275
* Elevator	—	,,	—	496	265
† Beverwijk XVII., cutter-dredger	—	,,	—	458	1,150
† Beverwijk VIII., bucket-dredger	—	,,	—	525	325

WORK ON HAND—

† Beverwijk XVI., bucket-dredger	—	Dutch	—	525	325
† Barge-unloading dredger	—	,,	—	450	900
† Schelde, bucket-dredger	—	,,	—	525	350
† Barge-unloading dredger	—	,,	—	450	1,080
* Deyffel and Roozand, bucket-dredgers	—	,,	—	267ea	260ea
* Cutter-dredger	—	—	—	295	400
† Barge-unloading dredger	—	—	—	525	1,080

† Triple. * Compound. *m* Motor. *a* Quadruple.
‡‡ Compound Surface Condensing. †*m* Triple Expansion and Motor.

Jan Smit, Czn, Alblasserdam.

Name of Vessel	Built of	Owners	G.T. Regis.	G.T. mchn. erect.	I.H.P.
Brunswik, cargo steamer	Steel	Dutch	2,142	—	1,200
Randwijk, cargo steamer	,,	,,	2,400	—	1,400
† Gelderland, cargo steamer	,,	,,	1,837	—	1,050
WORK ON HAND—					
† Cargo steamer	Steel	Danish	1,900	—	1,050
† Cargo steamer	,,	Dutch	1,837	—	1,050

E. J. Smit & Zoon, Hoogezand.

* Rensteu, cargo-boat	Steel	Dutch	250	—	200
* Dockyard 5, tug-boat	,,	,,	60	—	250
* Pors, tug-boat	,,	,,	85	—	200
m Daventria, motor	,,	,,	100	—	75
Floating crane, 20 tons	,,	,,	40	—	—
11 Lighters	Steel	Home and abroad	940	—	—
WORK ON HAND—					
Lighter	Steel	German	320	—	—
Motor tank schooner	,,	French	360	—	200
4 Lighters	,,	German	180	—	—
Motor tug-boat	—	—	—	—	30

W. F. Steel & Zoon, Alkmaar.

5 Motor-boats	Steel	—	total	212	—
4 Motor-launches	,,	—	total	52	—
3 Motor-yachts	,,	—	total	42	—
Cargo-barge	,,	—		13	—
16 smaller boats	,,	—	total	72	—
WORK ON HAND—					
6 Motor vessels	Steel	—	total	166	—
2 smaller boats	,,	—	total	44	—

Van Vliet & Co., Hardinxveld.

Aventnur 4, river lighter	Steel	Dutch	821	—	—
Wiestroom and Uilsang, cargo steamers	,,	British	626ea	—	—
Laeken and Hoboken, river-lighters	,,	Belgian	618ea	—	—
WORK ON HAND—					
2 Cargo steamers	Steel	British	630ea	—	—
River-lighter	,,	Dutch	525	—	—
River-lighter	,,	,,	183	—	—
Cargo steamer	,,	British	630	—	—

A. Vuijk & Zonen, Capelle a/d Yssel.

††Luna	Steel	Dutch	—	1,836	1,050
††Waal	,,	,,	—	1,375	900
P and Q, Lighters (no engines)	,,	German	—	1,070ea	—
††Bienvenido	,,	British	—	1,294	926
††Yssel	,,	Dutch	—	1,344	900
River-lighter	,,	German	—	1,350	—
2 Sea-going lighters	—	,,	—	740	—
3 River-lighters	—	,,	—	—total 4,667	—
3 Lighters	—	Belgian	—	5,235	—
WORK ON HAND—					
††Waalstroom	Steel	Dutch	—	app. 1,500	900
††Medea	,,	,,	—	1,850	1,050
††Orion	,,	,,	—	d.w. 4,000	1,500
2 Sea-going lighters	—	German	—	—	—
6 River lighters and smaller craft					

Conrad Werf, Haarlem.

† 4 Grain elevators	—	Holland	—	350ea	650ea
m Hospital ship	—	,,	—	170	—
* Suction dredger	—	Spanish	—	1,020	300
m 2 Floating cranes	—	Indies	—	620	—
3 Unloading boats	—	Italian	—	100ea	—
* Stern-wheel	—	N. Indies	—	40	70
* Suction dredger	—	Bahia	—	310	600
Suction dredger	—	N. Indies	—	58	—
2 Dredgers	—	—	—	122 ea.	—
WORK ON HAND—					
Concrete boat	—	Bahia	—	195	—
Suction dredger	—	Enzeli Teheran	—	800	300
Floating crane	—	Montevideo	—	1,750	600
3 Dredgers	—	—	—	total 928	—

Werf Gusto, Schiedam.

† Suction-dredger	—	Dutch	1,600	—	2,000
* 2 150-ton Floating cranes	—	Abroad	1,100ea	—	240ea
† Tug	—	,,	260	—	500
* Coal elevator	—	Dutch	600	—	400
* Barge-emptying dredger	—	,,	160	—	200
* Bucket-dredger	—	Abroad	320	—	300
* 2 Stone-carrying vessels	—	,,	220	—	—
† 4 Hoppers	—	,,	2,400	—	1,400
* Bucket-dredger	—	,,	500	—	450
3 Hopper barges	—	,,	780	—	—
8 Gusto-Diesel motors	—	—	—	—	1,750
WORK ON HAND—					
* 150-tons Floating crane	—	Abroad	1,100	—	480
* 400-tons Floating crane	—	,,	2,100	—	1,200
* Bucket-dredger	—	,,	280	—	200
† Suction dredger	—	,,	450	—	1,300
* Bucket-dredger	—	,,	530	—	650
* Blue metal conveyor	—	,,	525	—	550
* 150-tons Floating crane	—	,,	2,100	—	950
* 60-tons Crane	—	,,	360	—	55
* 100-tons Crane	—	,,	840	—	55
* Suction-dredger	—	,,	250	—	200
Hopper barge	—	,,	450	—	—
* 2 Suction dredgers	—	,,	900	—	3,900
6 Block-carrying barges	—	,,	1,500	—	—
* 1 Coal-transporter	—	,,	1,000	—	400
* 2 Coal-transporters	—	,,	3,000	—	1,700
12 Gusto-Diesel motors	—	—	—	—	2,100

† Triple Expansion. * Compound. †† Triple Surface Condensing. *m* Motor.

Werf de Noord, Alblasserdam.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. mchn. erect.	I.H.P.
Lighter	Steel	Dutch	300	—	50
2 Lighters	,,	,,	1,000ea	—	—
2 Lighters	,,	,,	2,950ea	—	—
WORK ON HAND—					
Steamer	Steel		600	—	—
2 Lighters	,,	Dutch	300ea	—	300
Steamer	,,	,,	600	—	—
7 Lighters	,,	,,	1,000ea	—	—

Van de Wetering Bros., Waddyk, Rotterdam.

‡‡Sara, tug	Wood	Brazil	—	—	125
‡‡Salida, towing-barge	Compo.	Sabang	—	—	100

In addition, a number of life-boats, collapsibles, etc.

Wortelboer & Co., Hoogezand.

Holsilda	Steel	German	850	—	—
Regina	,,	Dutch	850	—	—
Christina	,,	Waspik	522	—	—
Max Stroneijer	,,	German	856	—	—
Agnes	,,	—	850	—	—
m Paddle-boat	,,	Belgian	70	—	—
Pontoon bridge		Dutch	50	—	—
Elevator	,,		100	—	—
WORK ON HAND—					
m 2 Paddle-boats	Steel	Belgian	300ea	—	—
Tug-boat	,,	Dutch	850	—	—
Elevator	,,	Servian	250	—	—
1 Vessel	,,	German	850	—	—
1 Vessel	,,	,,	600	—	—
3 other vessels	,,	Koustanz	1,500ea	—	—
1 Vessel	,,	German	850	—	—

Gebr. Zwolsman, Ysl, near Friesland.

9 Motor vessels	—	—	—	total 381	—
2 Schooners	—	—	—	total 137	—
L'Esperance, tug-boat	—	—	—	17	—
Young Bill, lighter	—	—	—	100	—
WORK ON HAND—					
3 Motor-boats	—	—	—	total 160	—

VESSELS ENGINED.

Alblasserdamsche Machinefabrik, Alblasserdam.

Name of Vessel.	Builders.	I.H.P.	Press. lbs.
† Florianopolis	Jonker & Stans	1,200	185
† Bello Herizonte	Gebrs. Pot	1,200	185
† Victoria, Districto Federal and Sao Salvador	Jonker & Stans	1,200ea	185ea
† Recife	Gebrs. Pot	1,200	185
† Dir L. Bulcke and De Walvisch	Gebrs. v.d. Windt	250ea	180ea
† Pres. Desiré Haas	,, ,,	500	180
† San Marco	Wed. C. Boele & Zoon	340	180
† La Floride	,, ,,	270	180
* Champion	,, ,,	550	120
† Nord	,, ,,	390	180
† Marseillais 28	,, ,,	250	170
† Gapean	,, ,,	200	180
† Verdon	Gebrs. v.d. Windt	200	180
WORK ON HAND—			
Firtalera and Cuyaba	Jonker & Stans	1,200ea	185ea
† Commerce	Wed. C. Boele & Zoon	390	180
† Not named	Bonn & Mees	560	200
† Not named	Gebrs. Boele	400	185
† 2, Not named	Wed. C. Boele & Zoon	270ea	180ea
† 2, Not named	J. Verwey, Jr.	250ea	180ea
† Haleur 3 and 4	Wed. C. Boele & Zoon	270ea	180ea
† Not named	,, ,,	80	185
† Not named	,, ,,	600	180

Kinderdijk Machinefabrik, Kinderdijk.

Rhein Preussen	J. & R. Smit's Scheepswerven	350	120
Charlois	,, ,,	300	120
Rinderdijk and Krimpen	,, ,,	450ea	180ea
Beverwijk 17	,, ,,	1,300	180
Beverwijk 8	,, ,,	370	150
WORK ON HAND— I.H.P., 5,020.			

Netherlands Engineering Co., Amsterdam.

† Van Cloon	Ned. Scheepsb. Mij.	3,150	180
* Singapore and Singhawang	,, ,,	375ea	120ea
m Juno	,, ,,	1,400	—
m Emanuel Nobel	,, ,,	2 × 1,400	—
WORK ON HAND—			
† Van Neck	Ned. Scheepsb. Mij.	1,400	180
† Houtman	,, ,,	3,400	180
a Prins der Nederlanden	,, ,,	2 × 3,600	210
† Rotti	,, ,,	5,150	210
m Unio	Palmers Co., Yarrow	2 × 1,100	—
m Cassis	Caledon Co., Dundee	2 × 1,100	—
m Eburna	Ned. Scheepsb. Mij.	2 × 1,100	—
m Artemis	,, ,,	2 × 1,100	—
m Friso	Rijkee, Rotterdam	1,400	—
m London	Rijkee, Rotterdam	1,400	—
m Friso	Marine Werf. Amsterdam	2 × 750	—
m Not named	Tyne Iron Shipbuilding Co.	2 × 1,400	—

† Triple Expansion. *a* Quadruple. †† Compound Surface Condensing. *m* Motor. * Compound.

Gebrs. Stork & Co., Overijsel, Hengelo, Holland.

Name of Vessel.	Builders.	I.H.P.	Prses. lbs.
* 5 sets	Werf. Conrad, Haarlem	1,020	—
† 6 sets	,, ,, ,,	3,600	—
WORK ON HAND—			
† 7 sets	Werf. Conrad, Haarlem	3,600	—
* 4 sets	,, ,, ,,	400	—

NORWEGIAN.

Akers Mek. Værksted, Christiania.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
† Nobel, S.S.	Steel	Norwegian	220	—	500
† Eagle, S.S.	,,	,,	179ea	—	700ea
† Norvegia and Zealandia	,,	,,	176	—	700
† Egeland, S.S.	,,	,,	153	—	500
† Norröna I., S.S.	,,	,,	144	—	500
† Njaal, S.S.	,,	,,	718	—	600
† Lab, S.S.	,,	,,	1,118	—	850
† Linga 3 and Zambesi, S.S.	,,	,,	144ea	—	500ea
† Commonwealth and Pagodroma, S.S.	,,	,,	179ea	—	700ea
† Karrakatta, S.S.	,,	,,	179	—	760
† Bjerk, S.S.	,,	,,	182	—	700
† Rnssell and Macqnarie, S.S.	,,	,,	156ea	—	500ea
† Plettenberg, S.S.	,,	,,	116	—	350
† Montebello and Hval, S.S.	,,	,,	182ea	—	700ea
† No. 349 S.S.	,,	,,	140	—	450
† No. 616 (engines only), S.S.	,,	,,	—	—	375
† No. 628 and 629 (engines only), S.S.	,,	,,	—	—	500ea
† No. 654 (engines only), S.S.	,,	,,	—	—	60
† Dantas Barreto, S.S.	,,	Abroad	144	—	500
† Minerva, S.S.	,,	,,	155	—	500
† Hekla, S.S.	,,	,,	135	—	470
WORK ON HAND—					
† No. 340, S.S.	Steel	Norwegian	720	—	600
† No. 348, S.S.	,,	,,	116	—	350
† No. 350 and 351, S.S.	,,	,,	140ea	—	450ea
† No. 354, S.S.	,,	,,	116	—	350
† No. 355, S.S.	,,	,,	140	—	450
† No. 356 and 357, S.S.	,,	,,	156ea	—	500ea
† No. 358, 359 and 360, S.S.	,,	,,	720ea	—	600ea
† No. 361, S.S.	,,	,,	800	—	600
m No. 362, S.S.	,,	,,	2,600	—	1,500
† No. 363, S.S.	,,	,,	150	—	200

All Engines by same establishment.

A. S. Bergens, Mec. Værksted, Bergen.

† P.G. Halvorsen, cargo	Steel	—	1,099	1,231	750
† Karma, cargo	Steel	Haugesund	1,103	1,230	750
† Odda, cargo	,,	Tvedestrand	1,101	1,231	750
† Bretagne, cargo	,,	Copenhgn.	1,097	1,227	750
† Paal and Edle, whalers	,,	Tönsberg	156ea	156ea	486ea
† Korsfjord, cargo	,,	Bergen	1,620	1,620	990
Engines only, 6 sets	—	—	—	—	2,024
WORK ON HAND—					
† 3 Vessels, cargo	Steel	—	3,820	4,080	2,490

Engines by same establishment.

Christiansand Mek. Værksted, Christiansand.

† Vegtind, pass. steamer	Steel	Norway	219	237	274
† Spiint, whaler	,,	,,	131	136	400
* Askőij, pass. steamer	,,	,,	128	135	150
WORK ON HAND—					
† No. 144, whaler	Steel	Norwegian	150	—	500
† No. 145, whaler	,,	,,	150	—	500
* No. 146, pass. steamer	,,	,,	66	—	70
† No. 147, pass. steamer	,,	,,	230	—	320

All engines by same establishment, except Nos. 144 and 145.

Fredrikstad Mek. Værksted, Fredrikstad.

† Sarpen, cargo	Steel	Sarpsborg	1,873	—	1,450
† Sosua, fruit	,,	Tönsberg	1,182	—	1,200
† Bowden, fruit	,,	,,	1,235	—	1,500
† Hnsö, cargo	,,	Arendal	1,824	—	1,450
† Standford, Stalheim, and No. 160, cargo	,,	Kristiania	1,476ea	—	1,200ea
† Orö, cargo	,,	Arendal	1,827	—	1,450
† No. 152, fruit	,,	Kristiania	1,255	—	1,500
4 Hopper Barges	,,	—	400	—	—
8 Lighters	,,	—	800	—	—

Engines only for 3 whalers.
Engines by same establishment.

WORK ON HAND—
One 6,200 ton D.W. Motorship and several steamers.

Nylands Værksted, Christiania.

† Rigi, cargo	Steel	Norway	—	1,912	1,250
† Scotland, P. & C.	,,	,,	—	1,490	1,500
† Bessheim, P. & C.	,,	,,	—	1,781	1,750
† Sorell, whaler	,,	,,	—	135	400
† Bastant, cargo	,,	,,	—	1,715	1,000
† Rüsheen, whaler	,,	British	—	109	300
† Linga I., whaler	,,	Norway	—	156	500
† Linga II., whaler	,,	,,	—	156	500
† Borgholm, cargo	,,	,,	—	1,719	1,000
† Lionell, whaler	,,	,,	—	135	400
WORK ON HAND—					
† Cargo Steamer	Steel	Norway	abt.1,610	—	1,600
† P. & C. Steamer	,,	,,	abt.1,610	—	1,600
† 5 Cargo Steamers	,,	,,	abt.1,720ea	—	1,000ea

All engines by same establishment.

* Compound. † Triple. *m* Motor.

Orens Mekaniske Værksted, Trondhjem.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
* Prouto, tug boat	Steel	Trondhjem	18	—	53

Engines by same establishment.

Porsgrunds Mek. Værksted, Porsgrund.

* Union IV., cargo	Steel	Norway	176	—	160
† Heard, whaler	,,	,,	167	—	438
† Dominion I., whaler	,,	,,	156	—	440
† Dominion II., whaler	,,	,,	156	—	540
† Graham, whaler	,,	,,	164	—	430
* No. 69, cargo	,,	,,	140	—	180

Engines by same establishment for 1st, 4th and 6th vessels.

WORK ON HAND—
† No. 71, cargo — Steel — 720 — 520

Engines by same establishment.

Stavanger Stoberi & Dok, Stavanger.

† Erich Lindoe	Steel	Norwegian	1,087	—	900
† Sjömanden	,,	,,	abt.1,070	—	900
WORK ON HAND—					
† S.S. 67	Steel	Norwegian	abt.1,060	—	1,100
† S.S. 69	,,	,,	abt. 450	—	650

Engines by same establishment.

Trondhjems Mek. Værksted, Trondhjem.

† Troija, passenger	Steel	Trondhjem	—	285	420
† Skagren, passenger	,,	Kristiansand	—	778	915
† Finmarken, passenger	,,	Stokmarknes	—	1,119	1,265
† Gjeso, cargo	,,	Arendal	—	1,094	820
† Roald Jarl, cargo str.	,,	Trondhjem	—	1,400	900
WORK ON HAND—					
† 5 Cargo steamers	Steel	—	1,090ea	—	820ea

Engines by same establishment.

SWEDISH.

Bergsunds Mek. Werkstads, Stockholm.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
dm Rindo, motor-boat	Steel	Waxholm	—	—	125eff
Abraham Rydberg, training ship	—	Stockholm	262	—	—
† Vineta, pass. steamer	—	Witby	700	—	1,200
Zangnäs Hofors, motor tug	—	Hofors	—	—	—
Georg Lionosoff, motor-boat	—	Baku, Russia	115	—	160eff

Engines for Vineta by same establishment.

WORK ON HAND—
2 Tugboats for Russia, and work for the Swedish Navy.

Eriksbergs Mek. Verkstad Ak., Gothenburg.

* Express	Steel	Sweden	100	—	190
* Gndran	,,	,,	240	—	120
WORK ON HAND—					
* Nya Enkapudz	Steel	Sweden	225	—	380
* S.S. No. 162	,,	,,	80	—	200
* S.S. No. 164	,,	Denmark	240	—	120
* S.S. No. 165	,,	Sweden	45	—	85
† S.S. No. 166	,,	,,	380	—	700

Engines by same establishment.

Goteborgs Nya Verkstads Akt. Gothenburg.

* Ost	Steel	Russian	38	—	150
† Hollandia	,,	Sweden	1,155	—	800
m Motor Barge	,,	Swed. Gov.	40	—	20B.H.P.
WORK ON HAND—					
† S.S. No. 331	Steel	Swedish	3,000	—	1,100
m No. 332	,,	,,	600	—	250B.H.P.
t No. 333, Battleship	,,	Swed. Navy	7,500Dis.	—	20,000

Triple and Compound engines by same establishment.

Kockams Mek. Verkstads Aktiebolag, Malmo.

4 Lighters	Steel	—	—	—	—
† Thai, freight steamer	,,	Sweden	—	1,358	700
WORK ON HAND—					
† Freight steamer	Steel	Sweden	—	1,358	700
t Munin, destroyer	,,	,,	—	—	8,500

Engines by same establishment.

Lindholmens Verksteds Akt., Gothenburg.

† Svanin, passenger steamer	—	Halmstad	680	—	850
† Yarisberg, passenger steamer	—	Finsberg	350	—	900
WORK ON HAND—					
† Term, cantilever ore str.	—	Stockholm	4,000	—	1,500
† 411, cargo steamer	—	,,	1,050	—	550
† 412, passenger steamer	—	Helsingfors	2,000	—	2,900
* 413, channel steamer	—	Gotsborg	200	—	150

Engines by same establishment.

Motala Verkstads Nya Aktiebolag, Motala, Sweden.

* Kemitt	Steel	Haparanda	—	115	300
* Wilhelm Tham	,,	Jönköping	—	283	250
* Orebro II. (engines only)	,,	Orebro	—	—	250

Engines by same establishment.

Oscarshamns Mek. Verkstads Och Skeppsdockas Aktiebolag, Oscarshamn.

* Gustafsberg VII., pass. steamer	Steel	Sweden	312	—	500
† Fernebo, cargo steamer	,,	Norway	1,439	—	800
† Oscarsborg, cargo steamer	,,	Swedish	abt.1,200	—	800
WORK ON HAND—					
† No. 246, cargo steamer	Steel	Swedish	abt.1,400	—	800

Engines by same establishment.

* Compound. † Triple. *t* Turbine. *dm* Diesel Motor. *m* Motor.

DANISH

H. V. Buhl & Co., Frederikshavn.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
m Homeward, trawler	Steel	Brazil	135	—	100
m Pedro Toledo	,,	,,	65	—	50
m Estu	,,	Baltischport	58	—	32
WORK ON HAND					
Steamer	Steel	Denmark	133	—	100
Cable boat	Wood	,,	306	—	122
m Schooner	Steel	Nykobing	330	—	120

Burmeister & Wain, Copenhagen.

Polarlys, steam	Steel	Norway	1,070	—	1,200
Christian X, twin screw	,,	Germany	1,931	—	2,500
† Aarhus, steam	,,	Denmark	1,027	—	2,300
Avanti, steam	,,	,,	2,128	—	850
Svecia, twin screw	,,	Sweden	3,716	—	2,000
WORK ON HAND—					
Seven motor vessels, of in all about 31,600 gross tons and 18,600 I.P.					
One steam vessel, of 900 gross tons and 1,000 I.P.					
Engines by same establishment					

Copenhagen Floating Dock & Shipworks, Ltd., Copenhagen.

† Kjellinghus, cargo and pass.	Steel	Kolding	674	—	1,000
Stella and Thyra, cargo	,,	Esbjerg	836ea	—	400ea
† H.A. Christensen, cargo	,,	Nykjbing	891	—	450
† Halsingborg, passenger	,,	Malmo	689	—	1,100
† Two Lighters	,,	Bangkok	total 114	—	—
† Hebe, cargo and pass.	,,	Odense	957	—	1,100
† Avance, cargo	,,	Korsor	1,300	—	625
Lichter	,,	Bangkok	20	—	—
WORK ON HAND—					
Four Lighters	Steel	—	125ea	—	—
* Tug Boat	,,	—	40	—	—
Floating Dock	,,	—	—	—	—
* 112 Sand Pump Dredger	,,	—	190	—	—
† Cargo Vessel	,,	—	abt.1,300	—	—
Engines by same establishment.					

Helsingors, Jernskibs & Maskinbyggeri, Elsinore, Denmark.

† Bergenhus and Christianssund, cargo and pass.	Steel	Danish	1,017ea	—	900ea
† Code, and Cagne, cargo	,,	Sweden	1,191ea	—	1,000ea
† Cro, cargo	,,	Denmark	1,022	—	800
WORK ON HAND—					
† Yard No. 138 & 141, cargo	Steel	Copenhagen	abt1,022ea	—	800ea
† Yard No. 139, tug and salvage, screw	,,	,,	ab 130	—	450
† Yard No. 140, cargo and passenger	,,	,,	ab2,460	—	3,300
Engines by same establishment.					

RUSSIAN.

Kolomnaer Maschinenfabrik A.G., Golutwin.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
19 Vessels, including a number of motor ships with Diesel engines	—	—	total 6,735dis.	—	—
Emanuel Nobel, cargo-boat	—	—	total 2,260dis.	—	—
Engines by same establishment.					

The Nevski Mechanical Works, St. Petersburg.

4 Vessels	—	—	—	—	—
WORK ON HAND—					
2 Vessels	—	—	—	—	—

FINNISH.

Maskin och Brobyggnado Aktiebolaget, Helsingfors.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
† Sarla Svylta, pass. steamer	Steel	Finnish	40	—	70
3 Motor boats	,,	Russian	8	—	18
Engines of first vessel by same Company.					
WORK ON HAND—					
sc Bucket dredger	Steel	Finnish	240	250	150
Pass. steamer	,,	Russian	150	210	2—125
¦ Evan, paddle steamer, cargo and pass.	—	,,	360	1,000	700
To be engined by same Company.					

ITALIAN.

Armstrong Gio, Ansaldo e Cia, Sestri Ponente.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
‡m6 Torpedo-boats	Steel	Italy	113ea	—	2,700ea
Titano, tug-boat	,,	,,	588	—	1,850
Libia, prot. cruis.	,,	,,	2,900	—	12,500
WORK ON HAND—					
Citta di Bari, cargo and pass.	Steel	Italy	1,500	—	1,800
Engines by same Company.					

* Compound. † Triple Expansion. *m* Motor.
sc Surface Condensing. ‡*m* Triple Motor.

G. Benelli (through Amerigo Gori), Italy.

Name of Vessel	Built of	Owner	G.T. Regis.	G.T. inclu. erect	I.H.P.
Annetta and Marina, 2 Sailing schooners	Wood	Italian	154ea	—	—
WORK ON HAND—					
Anacleto, sailing schooner	Wood	Italian	—	287	—
Argietta, sailing schooner	,,	,,	—	168	—

Cantiere Navale Poli, Chioggia.

12 Barges	Steel	Italian Navy	480	—	—
2 Floating Cranes for lifting submarine vessels.	,,	,,	—	—	—
WORK ON HAND—					
10 Barges	Steel				

Fratelli Orlando (through Amerigo Gori), Italy.

m Fusalia, submarine	Steel	Italian Gov.	—	250	—
m Espidarte, submarine	,,	Portuguese	—	250	—
t Ardito, T.B.D.	,,	Italian	—	615	—
Engines by same Company.					

N. tu A. Odero & Co., Sestri Ponente.

† 10 Torpedo-boats	Steel	Italy	120ea	—	3,000ea
Engines by same Company.					

Officine & Cantiere Napoletani C. & T. T. Paltison, Naples.

‡ 7 Torpedo-boats	Steel	Italian Ny.	130dis.ea	—	3,500ea
t 3 Destroyers, Indomito, Intrepido, Irrequieto	Steel	Italian Ny.	700dis.ea	—	abt.18,000
Engines by same Company.					
WORK ON HAND—					
5 Torpedo-boats as above, and 3 Destroyers as above, all for the Royal Italian Navy.					
Engines by same Company.					

Societa Anon. Cantieri Navale Reunite di Muggiano, Spezia.

† Firenze, pass. steamer	Steel	Italy	—	3,973	3,690
†Carlo, cargo-boat	,,	,,	—	5,572	2,280
2 Barges	—	—	—	135ea	—
m Jantina, submarine	Steel	Italian flag	—	—	—
m Salpa, submarine	,,	,,	—	—	—
WORK ON HAND—					
No. 73, Sister-ship of "Firenze."					
No. 76, Sister-ship of "Carlo."					

Soc. Anon. Veneziana Industrie Navali e Meccaniche, Venice.

A. Poerio, tug-boat	Steel	Italian	30	—	—
F. Menalrea, tug-boat	,,	,,	30	—	—
M.D. 12, Scout-boat	—	Italian Gov.	14	—	—
Fireboats Nos. 26 and 27	—	,,	12ea	—	—
WORK ON HAND—					
3 Tug-boats	Steel	Italian	125	—	—
2 Scout-boats	,,	Italian Gov.	15ea	—	—
Dredger	,,	Italian	62	70	—

Societa Cooperativa di Produzione Sampierdarena, Sampierdarena.

* Liguria, tug-boat	Steel	Italian	114	114	400
WORK ON HAND—					
† Italia, tug-boat	Steel	Italian	217	256	650

Societa Esercizio Bacini, Genoa.

† Roma	Steel	Italian	3,000	4,000	4,000
Engines by same Company.					
WORK ON HAND—					
Australia, sail	Steel	—	—	850	—
Zelandia	,,	—	—	850	—

VESSELS ENGINED.

The Fiat Co., Turin (per Messrs. Graziani & Co., London).

Name of Vessel.	Builders.	I.H.P.	Press. lbs.
Submersible torpedo-boats, R. Italian Navy: Argo, Fisalia, Salpa, Medusa, Jantina	Fiat San Giorgio, Spezia	700, 800ea B.H.P.	—
Engined with Fiat heavy oil engines.			
Espadarte, Portug. Navy	—	—	—
Picket-boats	Naval yards and various builders	—	—
WORK ON HAND—			
8 other Submersibles	Fiat San Giorgio, Spezia	700/800ea B.H.P.	—
2 Submersibles	Naval Yards	1,500/2,000ea B.H.P.	—
1 Submersible	Private builders	—	—
6 Tank-boats	,, ,,	3,000B.H.P.	—
1 Cargo-boat	,, ,,	2,500B.H.P.	—
1 Cargo and pass. boat.	,, ,,	5,000B.H.P.	—

SPANISH.

Compania Euskalduna de Construccion y Reparacion de Buques, Bilbao.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
† Basurto, single-deck	Steel	Spanish	—	411	49
† Larrasquita, single-deck	,,	,,	—	411	49
† Cabo Cervera, awng. deck	,,	,,	—	2,200	187
WORK ON HAND—					
† Gorbea-meudi, single-deck	Steel	Spanish	—	abt.4,200	—
Pontoon for 130-ton sheerlegs	,,	,,	—	—	—
* Steamship	,,	,,	—	100	—
† Tug	,,	,,	—	120	—
† Steamship, awng. deck	,,	,,	—	2,400	—

m Motor. *t* Turbine. † Triple Expansion. * Compound.

AMERICAN.

The American Car & Foundry Co. Jackson & Sharp Plant, Wilmington, Del.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
* B. H. B. Hubbard, Jr., W. P. James and Warren J. Courtney, fishing steamers	Wood	U.S.A.	—	276ea	550ea
* Frank Somers, fishing steamer	,,	,,	—	309	550
* Otis W. Douglas, fishing steamer	,,	,,	—	295	550
Nos. 15, 16 and 12, 3 Dump Scows	,,	,,	—	tot. 2,200	
No. 24, Deck Lighter	,,	,,	—	500	—
York, steam lighter	,,	,,	—	1,100	—
Nos. 40, 41 and 42, 3 Dump Scows	,,	,,	—	800ea	—
R R. Nos. 14 and 15, 2 Dump Scows	,,	,,	—	1,000ea	—
WORK ON HAND—					
2 Car floats	—	—	—	1,600	—
4 House-boats	—	—	—	1,200	—
2 Dump scows	—	—	—	2,000	—

The American Shipbuilding Co., Cleveland and Lorain, Ohio.

Cleveland :—					
† City of Grand Rapids, pass. steamer	—	U.S.A.	1,572	3,061	3,500
* Frank C. Osborn, sand sucker steamer	—	,,	345	681	500
Milwaukee 22, dump scow	—	,,	762	762	—
No. 83, bulk oil barge	—	,,	2,053	2,452	—
No. 84, bulk oil barge	—	,,	2,052	2,451	—
Lorain :—					
† Renown, bulk oil steamer	—	U.S.A.	2,098	4,154	1,800
† J. A. Farrell, bulk freight steamer	—	,,	Not measured		1,880
† P. Roberts, Jr., bulk freight steamer	—	,,	,,	,,	1,880
* No. 89, bulk oil barge	—	,,	2,053	2,452	—
† No. 90, bulk oil barge	—	,,	2,052	2,451	—

All engines by the same Company.

The Bath Iron Works, Bath, Me.

t Jouett, T.B.D.	—	U.S. Gov.	740dis.	— shaft 12,000	
t Jenkins, T.B.D.	—	,,	740dis.	— shaft 12,000	
WORK ON HAND—					
t Cassin, T.B.D.	—	U.S. Gov.	—	1,020dis.	shaft 16,000
t Cummings, T.B.D.	—	,,	—	—	shaft 16,000
Pass. day steamer	Steel	American	—	abt. 600	1,200

Also 2 compound reciprocating engines for U.S. Destroyers building by New York Shipbuilding Co.
Engines by same establishment.

G. G. Deering & Co., Bath, Maine.

WORK ON HAND—					
5-Mast Schooner	—	Wood	—	1,700	—

Detroit Shipbuilding Co., Detroit, Mich.

a Calcite, self-unloading freight steamer	—	U.S.A.	—	3,996	1,700
† Lucius W. Robinson, bulk freight screw-wheel stmr.	—	,,	—	1,655	1,000
* Seeandbee, side-wheel pass. steamer	—	,,	—	7,000	10,000

WORK ON HAND—
Two bulk freight screw-wheel steamers, about 1,700 tons each, not yet launched.
One side-wheel passenger steamer, "Seeandbee," already launched, but which will require about 8 months to complete.

The Fore River Shipbuilding Co., Quincy, Mass.

rc Henley, destroyer	—	American	742dis	—	450ea
* Swell and Surf, trawlers	—	—	250ea	—	—
t Duncan, destroyer	—	—	1,000dis.	—	—
o 203 and 204, Submarines	—	—	—	—	—
t Nevada, battleship	—	—	27,500dis.	—	—
o Niagara, submarine tender	—	—	—	—	—
† Nelson, tank steamer	—	American	4,747	—	—
† Frieda, freight steamer	—	,,	2,994	—	—
† Richmond, oil steamer	—	,,	—	—	—
210 and 211, Car floats	—	—	—	—	—
* Wave, Billow and Breaker, trawlers	—	American	255ea	—	450ea

All, except Niagara, engined by same establishment.

Great Lakes Engineering Works, Detroit, Mich.

* Yaguez, Bayamon, Robert M Thompson, A. A. Raven and Ruby, package freighters	Steel	U.S.A.	2,551ea	—	1,480ea
† Edison Light and George Hagey, package freighter, dump scow	,,	,,	2,549ea	—	1,350ea

Engines by same Company.

Greenport Basin & Construction Co., Greenport.

Eight vessels, comprising 5 launches, 1 tug, 1 ketch of wood, and 1 steel freighter, mostly fitted with gasoline motors.

* Compound. † Triple. *t* Turbine. *a* Quadruple.
rc Reciprocating and Turbine. *o* Oil.

Harlan & Hollingsworth Corp., Wilmington, Del.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
†† Cordova, lumber and pass.	Steel	U.S.A.	2,273	—	1,200
†† Columbia, lumber and pass.	,,	,,	1,923	—	1,200
†† California, lumber and pass.	,,	,,	abt. 1,800	—	1,200
†† John A. Hooper, coaster	,,	,,	abt. 2,200	—	1,700
†† Henry Williams, coaster	,,	,,	1,861	—	850
†† Germantown, sea-going tug exc. steamer	,,	,,	abt. 647	—	1,050
b Rose Standish, exc. steamer	,,	,,	abt. 900	—	1,400
nc Mauch Chunk, harbour lighter	,,	,,	287	—	450

First six vessels engined by same Company; engines built for vessels launched by other firms, see Engine Section.

WORK ON HAND—

† Narragansett, twin-screw freight and pass.	Steel	U.S.A.	abt. 4,000	—	2 engines 4,800ea
† Manhattan, twin-screw freight and pass.	,,	,,	abt. 4,000	—	2 engines 4,800ea
† Ferry-boat No. 10 for Central R. R. Co. of N.J.	,,	,,	abt. 1,565	—	1,500
Car Floats 45 and 46	,,	,,	abt. 852ea	—	To be t'wed

Manitowac Dry Dock Co., Manitowac, Wis.

Richard Fitzgerald, tug	Steel	U.S.A.	—	167	500
Floating Dry Dock	—	—	—	cap. 4,500 tons	—
Hull 56, tug	Steel	U.S.A.	—	140	500

WORK ON HAND—
Hulls :—58, dipper dredger; 59, sand dredger; 60, hydraulic dredger.

Maryland Steel Co., Sparrow's Point, Maryland.

† Orion and Jason	Steel	U.S.A.	—	10,650ea	7,000ea
a Minnesotan and Dakotan	,,	,,	—	6,600ea	4,000ea
ct Dorchester and Talbot	,,	,,	—	1,090ea	1,000ea

All Engines by same Company.

WORK ON HAND—

a Montanan, Pennsylvanian, Panamanian, Ohioan, Iowan, and Washingtonian	Steel	U.S.A.	—	6,600ea	4,000ea
† Nos. 134 and 135	,,	,,	—	—	2,200ea

To be engined by same Company.

Newport News Shipbuilding & Dry Dock Co., Newport News.

Tuna, submarine	—	U.S. Navy	—	—	—
Fanning, T.B. destroyer	—	,,	—	—	—
Texas, battleship	—	,,	—	—	—
Miami, rev. cutter	—	,,	—	—	—
Unalga, rev. cutter	—	,,	—	—	—
Protens, collier	—	,,	—	—	—
† Lenape, freight	—	U.S.A.	3,144	—	1,200
† Evelyn, freight	—	,,	5,179	—	3,500
† Lenape, freight and pass.	—	,,	3,141	—	1,200
† Carolyn, freight	—	,,	2,168	—	1,800
† Adeline Smith, lumber	—	,,	1,400	—	—
Not named, car float	—	,,	—	—	—
† Peter H Crowell, freight	—	,,	3,100	—	1,200

WORK ON HAND—

Protens, collier	—	U.S. Navy	—	—	—
Nereus, collier	—	,,	—	—	—
Texas, battleship	—	,,	—	—	—
† Lenape, freight and pass.	—	U.S.A.	5,179	—	3,500
† Peter H. Crowell, freight	—	,,	—	—	1,200
† Illinois, oil steamer	—	,,	5,100	—	2,800
† Lorenzo, freight	—	,,	3,060	—	1,500
U.S. Am. Lighter, No. 24.	—	,,	—	—	—
Not named, Oil barge	—	,,	9,000	—	8,500
† Matsonia, freight and pass.	—	,,	5,100	—	2,350
† Not named, Oil steamer	—	,,	6,900	—	4,000
† Manoa, freight and pass.	—	,,	—	—	—

Engines by same establishment.

New York Shipbuilding Co., Camden, New Jersey.

No. 14, Car. float	Steel	U.S.A.	800	—	—
pt Jarvis, T.B.D.	—	U.S. Navy	742disp.	—	12,000
† Ontario and Sonomo, tug-boats	—	U.S. Navy	1,120ea	—	1,800ea
pt Fei Hung, protected cruiser	—	Chinese Ny.	2,600	—	7,000
Rayo, bulk oil	—	U.S.A.	3,663	—	1,800
Pontoon	Steel	U.S. Govt.	800	—	—
† Gulfoil, bulk oil	—	Port Arthur	5,188	—	2,500
† El Segundo, bulk oil	—	U.S.A.	3,663	—	1,800
† Middlesex, collier	—	,,	4,727	—	2,100

Engines by same Company.

WORK ON HAND—

Downes, T.B.D.	—	U.S. Navy	1,019	—	1,700
Oklahoma, battleship	—	,,	27,000	—	24,000
Moreno, Argen. battleship	—	Argentine	27,600	—	40,000
Vesta and Socony, bulk oil	—	U.S.A.	3,500ea	—	1,800ea
Norfolk, collier	—	,,	3,700	—	1,750
Congress, pass. and freight	—	,,	9,050	—	8,000
Washington Irving, pass. and side-wheel	—	,,	5,200	—	4,500
2 Car Floats	Steel	,,	1,000ea	—	—

For 2nd to 7th vessel, inclusive, engines by same Company.

†† Triple Surface Condensing. *b* Beam. *nc* Non-Condensing.
ct "Corliss" Twin. † Triple. *a* Quadruple.
pt Parson's Turbine.

James Rees & Sons Co., Pittsburg, Pa.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
Fourteen	Steel	Para	100	—	100
WORK ON HAND—					
2 Vessels	—	—	40	—	30
1 Vessel	Steel	—	100	—	100

A. D. Storey, Essex, Mass.

Eight vessels, schooners and fishing, built of wood, some fitted with motors.

Joseph Supple, Portland, Oregon.

Geo. H. Mendell, steam tug	—	American	145	—	—
Grahamona, river steamer ..	—	,,	213	—	—

The Toledo Shipbuilding Co., Toledo.

* Thousand Islander, pass. ..	Steel	Canadian	355	—	700
† Geo. E. Warren and L. V. Sheddard, freighters	,,	American	2,306ea	—	1,250ea
Contract 128, Mississippi River Steamer, hull only	,,		—	—	—
* Sainte Marie, car ferry	,,	St. Ignace	1,600	—	2,170

Engines by same Company.

Union Iron Works Co., San Francisco, Cal.

† Wm. Chatham, lumber steamer	Steel	U.S.A. abt.	1,470	—	1,250
dm No. F2, submarine	—	U.S. Navy	—	—	780

First vessel engined by same firm, submarine by Electric Boat Co.

WORK ON HAND—					
H. T. Scott, lumber steamer	Steel	U.S.A. abt.	1,470	—	1,250
Ardline, lumber steamer	,,	abt.	1,270	—	1,250
Stern-Wheel Tank Steamer	—	—	—	—	175
Five submarines	—	U.S. Navy	—	—	—

Engines by :—First 3, Union Iron Works, Submarines by Electric Boat Co.

The U.S. Navy Yard, Mare Island, Cal.

e U.S.S. Jupiter, collier ..	Steel	—	19,360dis.	10,644	7,200

WORK ON HAND—

U.S.S. Jupiter (steel collier).

U.S.S. Palos, and U.S.S. Monocacy (river gunboats, steel).

VESSELS ENGINED.

Name of Vessel.	Builders.	I.H.P.	Press. lbs.
Harlan & Hollingsworth Corp., Wilmington, Del.			
†† Christina, twin-screw yacht, steel	The Pusey & Jones Co. (2 engines)	1,000	250
* Wilbert A. Edwards, fishing steamer of wood	M. M. Davis & Son, Solomons, Va.	480	150
* City of Lewes and Henlopen, fishing steamer of wood	Wm. J. Abbott, Milford, Del...	480ea	150ea
* B. H. B. Hubbard, Jr., W. T. James, Warren J. Courtney, Frank Somers and Otis W. Douglas, fishing steamers of wood ..	American Car & Foundry Co., Wilmington, Del.	480ea	150ea
* Philip K. Banman, fishing steamer of wood	M. M. Davis & Son, Solomons, Va.	480	150

Vessels built and also engined by the firm, see Launch Section.

WORK ON HAND—				
†† The P. & J. Engine Yacht, steel	The Pusey & Jones Co., Wilm., Del. .. .. (2 engines)	1,000	250	
* Delaware Fish Oil Co., fishing steamer, wood	E. J. Tull, Pocomoke City, Nid.	400	150	
* Lewes Fisheries Co., No. 3, fishing steamer, wood	Wm. J. Abbott, Milford, Del...	480	150	
Marine Iron Works, Chicago.				
Richard Fitzgerald, tug, steel	Manitowac Shipbuilding & Dry Dock Co.	500	180	
Sheriffs Mfg. Co., Milwaukee.				
Hull 56, tug, steel ..	Manitowac Shipbuilding & Dry Dock Co.	500	180	
Termaat & Monahan Co., Oshkosh, Wis.				

11 sets of engines for light, medium and heavy work.

CANADIAN.

Collingwood Shipbuilding Co., Ltd., Collingwood, Ont.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
Steel Drill Boat, equipped with steam rock drilling apparatus..	—	—	185dis.	—	—
† Keybell, bulk freight steamer	Steel	Canada	1,730	—	800
† Estevan, T.S. Lighthouse and buoy steamer	,,	Can. Govt.	1,161	—	1,500

Engines by same Company.

* Compound. † Triple. *dm* Diesel Motor. *e* Triple-expansion. †† Triple Surface Condensing.

Collingwood Shipbuilding Co., Ltd., Collingwood, Ont. (*Continued*).

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
WORK ON HAND—					
† Bulk freight steamer	Steel	— est.	7,600	—	1,800
† 2 Single-screw bucket dredgers	,,	Gov. service	1,475dis.	—	625

G. T. Davie & Sons, Levis, Quebec.

† Steel screw hopper barge, No. 1..	—	Canada	800	800	500

Have done plenty of repair work.

Kingston Shipbuilding Co., Ltd., Kingston, Ont.

† Bellechasse, T.S. Survey and inspection steamer	Steel	Can. Govt.	530dis.	—	1,000

The Kingston Shipbuilding Co., Ltd., only build the hulls. The designing and drawing are done by the Collingwood Shipbuilding Co., Ltd., who control this yard and who build the engines and boilers.

WORK ON HAND—					
† Dollard T.S. Lighthouse and buoy steamer	Steel	Can. Govt.	985dis.	—	1,000

Polson Iron Works, Toronto, Ont.

‡ G. R. Geary, tug	Steel	Canada	82	—	260
‡ 2 Paddle steamers	Compo	,,	9ea	—	total 35
* Launch	,,	,,	8	—	25
* Kwasind, yacht club tender	Steel	,,	55	—	75
Faugh-a-Ballagh, scow ..	,,	,,	150	—	—
* Tug	,,	,,	100	—	260
‡ Batchawana, tug	,,	,,	45	—	130
‡ Launch	Compo	,,	8	—	15

All engines by same Company.

AUSTRALIAN.

Morrison & Sinclair, Balmain, Sydney, N.S.W.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
† Kabu, ferry-boat	—	—	—	—	670
† Kamiri, ferry-boat	—	—	—	—	370
Deliah, harbour tug	—	—	—	—	—
WORK ON HAND—					
3 Ferry-boats	—	—	—	—	—
1 Yacht	—	—	—	—	—

Engines by same establishment.

Morts Dock & Engineering Co., Ltd., Balmain, Sydney.

† Kirawa	Steel	Australian	258	—	700
† Balgowlah	,,	,,	499	—	1,400
† Kanangra	,,	,,	258	—	700
WORK ON HAND—					
† Steamer 39	Steel	Australian	499	—	1,400

To be engined by same firm.

JAPANESE.

Ishikawajima Shipbuilding & Engineering Co., Ltd., Tokyo.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
* Yoji Maru	Steel	Japanese	249	—	240
* Kashiwa, paddle..	Wood	,,	57	—	60
* Katsura, paddle	,,	,,	57	—	60
* Fuyo, paddle	,,	,,	50	—	60
† Kuio Maru	Steel	,,	230	—	500
* Funashima Maru	Wood	,,	40	—	140
5 Non-propelling steam dredgers	Steel	—	—	abt.73	—
1 Wooden pontoon for floating crane..	—	—	—	abt.85	—

Engines by same Company.

CHINESE.

The Kiangnan Dock & Engineering Works, Shanghai.

Name of Vessel.	Built of.	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
Kiangwah, river steamer ..	—	China	4,131	—	3,000
3 Lightships	Steel	,,	90	—	—
Uspenski, towboat	,,	Russia	44	—	150
m Borneo, tw.-sc. motor bt. ..	—	China	50	—	150
m Kuang Ming, motor launch	—	,,	25	—	35
2 tw.-sc. Tunnel Towboats..	—	Russia	125	—	300
2 Lighters	Steel	China	280	—	—
Republic, tw.-sc. launch ..	—	,,	45	—	140
5 Lightships	Steel	,,	150	—	—
Oxygen, s.-sc. launch ..	—	,,	48	—	130
m Arrow, tw.-sc. motor launch	Wood	,,	55	—	80
Ping-An, launch	,,	,,	40	—	80
Chang Loong, launch ..	Steel	,,	50	—	100
4 Steel pontoons..	—	,,	1,031	—	—

All engines other than motors by the same Company.

† Triple. ‡ High-Pressure. * Compound. *m* Motor.

New Engineering & Shipbuilding Works Co., Shanghai.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
† Mei-Foo, twin-screw	Steel	Chinese	—	912	1,200
m Mei-Kiang, twin-screw	,,	,,	—	224	150
m 2 Vessels, twin-screw	,,	,,	—	450	300
m 2 Vessels, screw	,,	,,	—	90	72
* Kaites, screw tug	,,	Russian	—	86	250
* Nini, twin-screw	,,	Chinese	—	46	120
m 7 Launches	Wood	,,	—	96	152
m 2 Launches, screw	Steel	,,	—	78	260
7 Pontoons	,,	,,	—	848	—
* Mei-Foo II., screw	,,	,,	—	40	90
Triple and Compound Engines by same Company.					
WORK ON HAND—					
m 2 Barges, twin-screw	—	—	—	—	—
5 Steam and motor launches	—	—	—	—	—

Shanghai Dock & Engineering Co., Ltd., Shanghai.

† Merritt, U.S. Army trpt.	Steel	Phil. Isls.	2,978	—	2,500
* 1 Tow-boat	,,	Chinese	45	—	200
Sundry small vessels, including :—					
1 Steel water-carrying boat, 6 Cargo lighters, 4 Pontoons	—	—	1,000	—	—
Engines by same Company.					
WORK ON HAND—					
1 Pontoon Hulk	Steel	—	1,700	—	—

HONG-KONG.

W. S. Bailey & Co., Hong Kong.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
m D.B. 1 and 2	Wood	Phil. Isids.	42ea	42ea	100ea
m No. 94	,,	Chinese	5	5	10
m J.D.S.	,,	Colonies	20	20	24
m Sutil	,,	,,	25	25	26
m Daphrona and Walronda	,,	,,	45ea	45ea	46ea
m Callelva	,,	,,	40	40	30
m 4 Boats	,,	,,	60ea	60ea	48ea
m White Rose	,,	Chinese	5	5	7
m Aux. sailing boat	,,	Penang	10	10	5
m Vedette	,,	Chinese	52	52	—
WORK ON HAND—					
‡‡2 Vessels	Wood	Chinese	tot. 110	tot. 110	tot. 185
m 3 Vessels	,,	,,	tot. 37	tot. 37	tot. 35
Compound Surface Condensing Engines by same Company.					

INDIAN.

Charles Brown & Co., Bombay.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
Molly Brown, tug and pass. tender	—	Indian	85	—	600
4 Barges, towing	—	,,	150ea	—	—
1 Hopper barge, towing	—	,,	200	—	—
1 Water barge, towing	—	,,	120	—	—
3 Barges, towing	—	,,	100ea	—	—
WORK ON HAND—					
3 Barges, towing	—	Indian	100ea	—	—
1 Live boat	—	,,	150	—	250
2 Hopper barges, towing	—	,,	100ea	—	—

Burn & Co., Ltd., Howrah, Calcutta.

Emperor, Empress and Durbar, tugs	—	Indian	200ea	—	650ea
3 Landing stages, Wagon Ferry	—	,, total	696	—	—
2 Wagon barges, Wagon Ferry	—	,, total	1,120	—	—
Pontoon	—	,,	60	—	—
14 Cargo barges	—	,, total	1,140	—	—
4 Wagon barges	—	,, total	2,000	—	—
1 Cooly barge	—	,,	30	—	—
4 Pontoons	—	,, total	1,900	—	—
Mercury, tug	—	,,	50	—	120
T.S. Launch	—	,,	43	—	130
Motor Launch	—	,,	43	—	120
2 Cargo barges	—	,,	42	—	—
15 Motor launches	Wood	,, total	66	—	150
150 tons Well Curbs.					
WORK ON HAND—					
2 Paddle steamers	—	—	—	—	860ea
m Fisheries Inspection schooner	Wood	—	—	—	120
m House-boat twin-screw	—	—	—	—	110
1 Tug single-screw	—	—	—	—	220
Several barges and landing stages.					
2 Oil tanks	—	—	—	—	—

Turner, Morrison & Co. (Shalimar Works, Ltd.), Calcutta.

‡‡Empress of India, st. launch	Steel	India	37	—	72
3 Lighters	,,	,,	80ea	—	—
3 Barges	,,	,,	100ea	—	—
Firefloat (towed)	,,	,,	20	—	—
Lighter	,,	,,	100	—	—
Pontoon	,,	,,	10	—	—
Engines by same Company.					
WORK ON HAND—					
24 Barges and lighters	—	— agg.	1,890	—	—

* Compound. † Triple. *m* Motor. ‡‡ Compound Surface Condensing.

STRAITS SETTLEMENTS.

Tanjong Pagar Dock Board, Singapore, S.S.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
Pilot screw launch	Wood	Singapore	20	—	80
2 Motor launches	,,	,,	3ea	—	—
3 Lighters	Wood	,,	total 120	—	—
‡‡2 Gov. launches	—	,,	total 220	—	total 220
Shallow draught steamer	—	,,	18	—	60
‡‡Tug, twin-screw	Steel	,,	145	—	400
‡‡2 Water-boats	,,	,,	184ea	—	220ea
/ Screw launch	Wood	,,	18	—	70
/ Screw launch	,,	,,	26	—	50
‡‡Screw ferry steamer	Steel	,,	135	—	230
All engines except motors by same establishment.					

United Engineers, Ltd., successors to Messrs. Howarth, Erskine, Ltd., and Messrs. Riley, Hargreaves & Co., Ltd.

‡‡Wanda, steam launch	Wood	Batavia	36	—	140
‡‡Baby, steam launch	,,	,,	13	—	50
‡‡Deli, steam launch	,,	Deli	20	—	85
‡‡Nora, patrol steamer	,,	Batavia	85	—	220
2 Lighters	,,	,,	57ea	—	—
Lighter	Steel	Telok Anson	48	—	—
1 Lighter, sailing	—	—	47	—	—
m Lighter	—	—	47	—	40
m Pilot launch	—	Batavia	9	—	30/40
Bukom and Sumboe, lighters	Wood	—	36ea	—	—
The first three vessels engined by same Company.					
WORK ON HAND—					
‡‡Steam launch	Wood	—	13	—	50
‡‡Stella and Theresa, patrol vessels	,,	Batavia	87ea	—	220ea
‡‡Steam launch	,,	—	20	—	80
‡‡Steam launch	,,	—	18	—	50
Lighter	—	—	—	—	60
Steam launches engined by same Company.					

WORK COMPLETED DURING THE YEAR.

ENGLISH.

Sir W. G. Armstrong, Whitworth & Co., Ltd., Newcastle-on-Tyne.—The mercantile marine vessels built at Walker shipyard from 1852 to 1912 number 723, and amount to a gross tonnage of 1,116 120, and 662,529 I.H.P. The warships built at Walker and Elswick shipyards during the same period total 130, displacement 538,254 tons, and 1,071,897 I.H.P.

S. P. Austin & Sons, Ltd., Sunderland.—The output of this Company during the year has been seriously interfered with by the miners' strike and other labour troubles, causing short deliveries of material from the mills, otherwise the return would have included at least one additional vessel. The four steamers launched were all specially adapted for the coal trade. Repairing work by this Company was very brisk during the first half of the year, but owing to the exceptionally good freights prevailing during the second half, vessels have been kept fully occupied and repair work consequently somewhat less in volume. The total tonnage of the vessels docked amounted to 250,000 gross register tons, and the work included several extensive damage repair contracts, re-classifications and overhauls. The pontoon is capable of taking the large vessels up to 8,000 tons deadweight capacity which now come to the port of Sunderland for loading.

Baird Bros., North Shields.—A notable item of repair work by this firm has been the completion, on 7th December, of an extensive overhaul, and conversion to a screw tug from a North Sea trawler. The vessel was formerly a trawler and Messrs. Baird cut away all obstructions and moved the boiler forward on to new seatings, a distance of 12 ft. 9 in. This was done to enable the towhook to be placed in proper position; the space where the boiler had been was made into a cross bunker, and an alleyway made through it to communicate with engine-room and stokehole. The fish hold was converted into a cabin, and the whole ship put in condition suitable for a deep sea or harbour tug.

The Blyth Shipbuilding & Dry Docks Co., Ltd., Blyth.—In addition to being shipbuilders, the Blyth Shipbuilding & Dry Docks Company, Ltd., are repairers of hulls and machinery, and in this department have during the year carried out some extensive repair jobs and alterations. Their five graving docks and ample facilities enable them to do work very expeditiously. During the year they have docked 275 vessels with a gross tonnage of 350,000. Amongst the vessels repaired was the steamer Beachy, of Glasgow (4,178 gross tons), comprising removal of engines and boilers, and the whole of the bottom removed and partly renewed. Several other large repair jobs have been carried out, viz., the steamers Jane Radcliffe, Nefeli, Vostizza, Germanic, Lomonosoff, etc. The steamer Ixia was converted into a tank steamer for the purpose of carrying molasses in bulk. The Company also execute repairs on vessels loading in the harbour, and about 300 steamers have been dealt with for sundry repairs.

Central Marine Engine Works, West Hartlepool.—In addition to engines built, a number of boilers for old steamers and a large amount of work of a miscellaneous character, particularly in steamship auxiliaries and forged stern frames and rudders, have been made.

/ Compound Non-Condensing. ‡‡ Compound Surface Condensing.
m Motor.

R. & W. Hawthorn, Leslie & Co., Ltd., Hebburn-on-Tyne. Dry Dock Department.—This Company's graving dock and repairing department has been engaged during the year on a variety of contracts, including extensive repairs in connection with the reclassification of steamers of all classes, and the conversion of the Clyde-built turbine steamer Kingfisher (re-named Venetia) to accommodate a large number of first second and third-class passengers: the vessel being fitted and brought up-to-date with all modern improvements for express passenger service on the Adriatic. In order to cope with the demand for dry dock accommodation for the increased size of steamers frequenting the Tyne the Company has arranged for the lengthening of their dry dock from 425 ft. to 460 ft.

Irvine's Shipbuilding & Dry Docks Co., Ltd. In the list of vessels launched during the year, and set out in the launch section is the La Correntina, one of the largest twin-screw frozen and chilled meat steamers afloat, built for Messrs. Houlder Brothers, London and is a sister vessel to the El Paraguayo built by Messrs. Irvine's Company last year; these vessels are fitted out for over 400 emigrants and a limited number of first-class passengers. The New Lindener is another passenger vessel, built for the Tyne-Tees Steam Shipping Co., Ltd., and is now running on the Newcastle and Hamburg weekly service besides other passenger and cargo vessels for Messrs. Elder Dempster & Co., Liverpool, etc. The tonnage for 1911 was 73,430 tons and 35,180 I.H.P. The graving docks have been kept well employed with repairs during the year and at the present time each dock is occupied.

Isherwood System of Ship Construction. The progress of this system of construction is shown by the following: From September, 1907, to December 1908, the number of vessels arranged to be built was six, representing about 19,747 gross reg. tons. During the years 1909, 1910, 1911 and 1912, the number was thirty, forty, sixty-seven and 101, 137 tons; representing 110,838, 190,196, 280,000 and 398,151 gross reg. tons respectively, a total for the whole period of 240 vessels of 1,078,151 gross reg. tons. The above 240 vessels have been constructed, or are being constructed by fifty-six firms of shipbuilders for seventy-nine firms of owners. The system is being operated in several countries, as will be shown by the following table:—United Kingdom, 145 vessels representing about 710,671 gross reg. tons; U.S.A., fifty-five vessels representing about 194,137 tons; Germany, twenty-four vessels representing about 109,179 tons; Holland, ten vessels representing about 26,386 tons; Canada, five vessels representing about 15,800 tons; Belgium, four vessels representing about 11,460 tons, France, one vessel representing about 3,500 tons, making the total as above given of 240 vessels representing about 1,078,151 gross reg. tons. Of the oil-tank steamers contracted for this year, by far the greater portion are on the Isherwood system, and up to the present time sixty-nine vessels of this type are already built or are in course of construction in the following countries: United Kingdom, fifty-two vessels representing about 291,553 gross reg. tons; Germany, twelve vessels representing about 69,200 tons; U.S.A., fifteen vessels representing about 38,850 tons; France, 1 vessel representing about 3,500 tons; Canada, 1 vessel representing about 2,400 tons, a total of eighty-one vessels representing about 405,503 gross reg. tons. During the course of the year some thirty-six vessels, built at Lorain for the Pittsburg Steamship Co., of Cleveland, Ohio, U.S.A., for service on the Great Lakes of America. This vessel is one of two duplicates of the William P. Palmer order, by the same owners. The two 13,000 tons d.w. colliers Orion and Jason, built at Sparrow's Point, Md., U.S.A., for the Navy Department of the Government of the United States of America. Vessels have now been built to the highest Classification of Lloyd's Register, British Corporation, Bureau Veritas, Germanischer Lloyd, Norske Veritas, and American Bureau.

Nicholson & Sons, Glasson Docks, Liverpool, have been extremely busy all the year with repairs in dry dock, but have not engaged in constructional work.

Wm. Pickersgill & Sons, Ltd., Sunderland.—During the year Messrs. Pickersgill have carried out important alterations to the building berths, and made extensive additions to the yard equipment and machinery department, and they are now in a position to build first-class vessels up to 11,000 tons deadweight.

Sir Raylton Dixon & Co., Ltd., Middlesbrough-on-Tees. In addition to building, as shown in launch section, a large amount of repairing work has been done by the yard.

John Readhead & Sons, Ltd., South Shields.—In addition, a large amount of repair work has been done in the graving dock department.

G. Rennie & Co., of Greenwich, London, moved their works from the Thames in January last, and purchased the business of Messrs. Forrest and Co., of Wivenhoe, Essex, where they now have extensive premises, covering 6 acres, with 800 feet of river frontage. They are equipped with a dry dock 235 ft. long, capable of taking vessels up to 14 ft. 6 in. draught. The works have been modernised in every way and equipped with heavy machine tools and new furnaces constructed by Mr. H. Tomkins, of Stockton, and they are now able to carry out the construction of any vessel up to 250 feet in length. Since the firm commenced building in March last the vessels to be found under the Launch Section have been completed. This firm has also carried out an extensive amount of work in connection with their dry dock and repair departments, including the overhaul and fitting out of many high-class yachts.

A. Rutherford & Co., Birkenhead.—Work for 1912 has been mainly upon motor and steam launches, Admiralty boats, pinnaces, etc., and a large amount of ship repairs.

The Seamless Steel Boat Co., Ltd., Wakefield. Output for the year has been twelve motor launches, varying from 18 ft. to 45 ft. in length, and 410 seamless steel lifeboats, varying from 16 ft. to 33 ft. in length. In hand there are five launches and 240 lifeboats.

The Shields Engineering & Dry Dock Co., Ltd., North Shields. In addition to the work done during 1912 and given under Engines Built Section, several large repair contracts were carried out and 2 vessels were altered into whalers. Tanks were fitted into a large sailing vessel for carrying oil in bulk, and a large steamer converted into a coaling station.

Swan, Hunter & Wigham Richardson, Ltd. The list of vessels launched by the firm will be found under the launch section. In addition to tonnage launched, the dry docks department carried out a large number of extensive repairs to ships, engines and boilers. During nine years ending 1912, Messrs. Swan, Hunter & Wigham Richardson, Ltd. have launched 189 vessels of 824,243 gross tons, an annual average of 21 vessels of 91,583 gross tons. Maximum (in year 1906), 25 vessels of 126,921 gross tons. Average of years 1911 and 1912 23 vessels of 125,691 gross tons.

John I. Thornycroft & Co., Ltd., Southampton. The totals of tonnage and H.P. are unusually small in comparison with the work in hand, which aggregates over 10,000 tons and 190,000 I.H.P. These figures are exclusive of 18 armoured motor patrol boats which were completed some time ago, and which are at present laid up in the yard awaiting the commencement of peace in the near East, and comprise seven torpedo-boat destroyers, an armoured customs cruiser of about 800 tons, two powerful tugs, two shallow-draught ferry steamers, diesel-engined yacht, a passenger and cargo steamer, a motor passenger vessel, a motor cargo-boat, two lightships, a number of Admiralty and other launches, etc. The building capacity of the yards has recently been largely increased by extensive additions both to plant and buildings, and the facilities both of shipyard and shops for marine construction of every type up to 3,500 tons and 30,000 S.H.P. (or with geared turbines upwards of 50,000) are now of the first order.

The United States Metallic Packing Co., Ltd., of Bradford, have supplied their metallic packing to the following vessels during the year: H.M.S.'s Isis, Pathfinder, Roxburgh, Marlborough, Iron Duke, Delhi, Benbow; s.s.'s Themistocles, Matathon, Militiades, for the Aberdeen Line, Ltd.; s.s.'s Warrilda, Wandilla, Willochra, for the Adelaide S.S. Co.; eight tugs for the Aire & Calder Navigation, Ltd.; t.s.s. Kanora, for the Canadian Telegraph Co., Ltd.; new steamer for Ambard & Bros.; s.s.'s Commuchee and Loonna, for the Anglo-American Oil Co.; s.s. Olympia, for the Anchor Line, Ltd.; s.s. Exquiel Ramos Mexia, for the Argentine North-Eastern Railway Co.; new steamer for Arnold & Co., Sydney; t.s.s. Indarra, for the Australasian United S.N. Co., Ltd.; s.s. Ajana, for the Australind Steam Shipping Co., Ltd.; s.s.'s Baron Brisck and Salzburg, for the Austrian Lloyd's Steam Navigation Co.; s.s. Test, for Bain, Sons & Co.; s.s. Erin's Isle, for the Bantry Bay Steamboat Co.; s.s. Novington, for Bell, Symondson & Co.; s.s. Mopsa, for Bennett S.S. Co.; s.s. Oxfordshire, for Bibby Bros. & Co.; s.s. Fjordheim, for the Blyth Shipbuilding and Dry Dock Co., Ltd.; s.s. Lady Wolseley, for the British & Irish Steam Packet Co.; new battleship for the Brazilian Government; s.s. Hero, for the Bristol Steam Navigation Co., Ltd.; s.s.'s Aronda and Erinpura, for the British India Steam Navigation Co., Ltd.; s.s. Ermine, for G. & J. Burns & Co., Ltd.; new steamer for Burns, Philp & Co., Ltd.; s.s. Kirkcudbright, for the Burnknall Line S.S. Co.; s.s. Burbridge, for Buddick and Cook; s.s. Avon, for the Carron Co., Ltd.; p.s. Glen Avon, for P. and A. Campbell, Ltd.; s.s.'s Princess Sophia and Mount Temple, for the Canadian Pacific Railway Co.; new ferry steamers for the Calcutta Port Commissioners; s.s.'s Royal George and Royal Edward, for the Canadian Northern Steamships, Ltd.; s.s.'s Carlton, Nurtureton, Floristan, Riverton and Amberton, for R. Chapman & Sons; s.s.'s Deptford, Hillingdon and Cowe, for Cory & Sons, Ltd.; s.s. Breaksea, for T. M. Collier, Bray; Barman, tug, for the Crown Agents for the Colonies; s.s.'s Aquitania, Lycia and new steamers for the Cunard S.S. Co.; s.s. Bernicia and a new steamer for J. Currie & Co.; s.s. Reina Victoria Eugenia, for the Compania Transatlantica; s.s.'s Hooton, Melton, Normanton and Fullerton, for the Denaby & Cadeby Main Colliery Co., Ltd.; s.s. Athenia, for Donaldson Bros., Ltd.; s.s. Oakfield, for the Doughty Shipping Co., Ltd.; s.s. Chio, for the Deutsche-Levante Petroleum Gesellschaft; s.s.'s Ebani, Abossa, Appam, Eloby and new steamers, for Elder, Dempster & Co.; s.s.'s City of Poona, Melton Hall, City of Marseilles, City of Dunkirk, City of Bristol, and five new steamers, for the Ellerman Lines, Ltd.; s.s.'s Arracataca, Chagres, Pacuare and new steamer, for Elders & Fyffes, Ltd.; s.s.'s Nervion and Reime, for Fearnley & Egar; s.s.'s Eagle and Fauvette, for the General Steam Navigation Co., Ltd.; s.s.'s Dundreman and Navarino, for Geo. Gow & Co.; s.s. Wreathiel and new steamer, for the Goole and West Riding S.S. Co., Ltd.; s.s.'s Killinghoime and Brocklesby, for the Great Central Railway Co.; s.s. Chincha and new steamer, for W. R. Grace & Co.; s.s. Derwent Hall, for Guthe Bros. & Co.; s.s.'s Karl Schurz and Emil L. Boaz, for the Hamburg-American Line; s.s.'s Harlech, Harlow, Harden, Harmatris, Harfield and new steamers, for J. & C. Harrison, Ltd.; s.s.'s Intombi, Benefactor, Architect and Diplomat, for T. & J. Harrison; s.s.'s Canberra Acre, for Howard Smith & Co., s.s.'s Waddon and Purley, for Houlder, Middleton & Co.; s.s.'s Jervaulx Abbey and Kirkham Abbey, for the Hull & Netherlands S.S. Co., Ltd.; s.s. Dokka, for Larintz W. Hansen, dredgers Oswald, Campbell and Lees, for the Indian Government; s.s. Ierne, for the Irish Lights Commissioners; s.s. Allanton, for the Irish S.S. Owners Co., Ltd. (Thos. Dixon & Sons, managers); cruiser, Haruna, for the Japanese Government; s.s.'s Tintern Abbey and Kildare, for Fredk. Jones & Co.; new steamer for W. & T. C. Jones S.S. Co., Ltd.; s.s. Arakan, for the Koninklijke Paketvaart Maatschappij; s.s. Pretesil, for the L. & Y. and L. & N.W. Railways; s.s.'s Humber and Hebble, for the Lancashire & Yorkshire Railway; s.s.'s Archimedes and Veronese, for Lamport & Holt, Ltd.; new steamer for Lowden Bros.; s.s. Langholm and new steamer, for the London and Northern Steamship Co.; s.s. Manchester Citizen, for the Manchester Liners, Ltd.; s.s. Yarrowdale, for R. Meikill & Co.; s.s. Clydesdale, for D. MacBrayne, Ltd.; s.s.'s Angola, Mascara and Masurua, for Mackay and McIntyre, Ltd.; s.s. Portloe, for McNeil, Hinde & Co.; s.s. Quelta, for the Mercantile Steamship Co., Ltd.; new steamer for the Mexican Oil Co.; new steamer for the Mexican Fuel Co.; s.s.'s Mavisbrook and Wyvisbrook, for Miller & Richards; two new steamers for the Moss S.S. Co.; s.s. Lucellum, for H. E. Moss & Co.; s.s. Edinburgo, Dublin and Mixico, for Nicholas Michaanovich & Co.; s.s.'s Holly Branch, Cedar Branch, Palm Branch and Elm Branch, for the Nautilus S.S. Co.; s.s. Koh-i-Noor, for the New Palace Steamers, Ltd.; s.s. Omi Maru, for the Nippon Yussen Kaisha; p.s. Dandie Dinmont, for the North British Railway; s.s. Pulganbar, for the North Coast of Auckland S.S. Co., s.s. Kristianiafjord and new steamer, for the Norwegian American Line; s.s.'s Itapura and Itatinga, for the Cia Nacional de Navi, Costera;

s.s.'s Birma, Kangean and Samarinda, for the Nederlandsche Steamboat Maatschappy ; two new steamers for the Pacific Steam Navigation Co.; s.s.'s John Payne and Brunel, for J. Payne & Co. ; new steamer for the Port Jackson & Manly S.S. Co. ; s.s.'s Crown of Toledo and Crown of Seville, for Prentice, Service & Henderson ; s.s. Purelight, for the Pure Oil Co., Ltd. ; s.s. Marmion and new steamers, for G. Pyman & Co. ; s.s. Possilipo, for Peirce Bros., Naples ; s.s. Marguerite, for Plesson & Cie ; s.s. Glanmire, for James Rankine & Son ; s.s. Dryden, for Rankin, Gilmour & Co. ; new steamers, for Reid, Newfoundland Co. ; s.s. Bruce, for J. Reid & Sons (ice-breaking steamer for Canada) ; s.s. Arachni, for Rickinson, Sons & Co. ; s.s.'s Darro, Drina and Monmouthshire, for the Royal Mail Steam Packet Co. ; s.s.'s Wellerby, Martin, Hartlepool and new steamers, for Ropner & Co. ; s.s. Tchihachoff and new steamers, for the Russian Steam Navigation & Trading Co. ; s.s. Wheatlands, for Spillers & Bakers, Ltd. ; s.s. Sturton, for Steel, Young & Co. ; Sydney ferry steamers, for Sydney Ferries, Ltd. ; s.s. Baron Bruck, for the Stabilimento Tecnico ; s.s. Narcis, for the Societe Anonyme d' Entreposage et de Transports ; s.s.'s Terrible and Exford, for Tatem & Co. ; s.s.'s Windsor and Picton, for Evan Thomas, Radcliffe & Co. ; s.s.'s Cordova and Rio Tinto, for John Tully & Son, Sunderland ; new steamer, for the Tyzer Line, Ltd. ; Segovia, for Otto Theresen ; Mahomed Rishod V., for the Turkish Government ; new steamer for the Ulster S.S. Co., Ltd. ; two new steamers, for the Union Castle Line S.S. Co. ; s.s.'s Pastores, Heredia, Cartago and two new steamers, for the United Fruit S.S. Co. ; s.s. Tuggerah, for the Wallarah Coal Co. ; s.s. Dalton, for Webster & Barraclough ; s.s.'s Birkhall, Annie, Askehall, Grantleyhall and Edenhall, for the West Hartlepool Steam Navigation Co. ; s.s.'s Buffalo, Tosno and Kolpino, for Thos. Wilson, Sons & Co., Ltd. ; s.s. Zillia and new steamer, for the Zillah Shipping Co.

SCOTCH.

Crans & Co.'s List (see Launch Section) is smaller than last year, but they have three vessels on the stocks at an advanced stage, and another three to lay down, of large size and power. Repairs and dry dock work have been carried out during the year on a larger scale than usual.

John Hastie & Co., of Kilblain Engine Works, Greenock, have during 1912 turned out a larger number of steam-steering engines and hand-steering gears than in any previous year of the firm's history. Concurrently with this record of work done, it is worthy of note that the firm's workshops have undergone thorough reorganization and extension, inasmuch as they are now enabled to practically double their previous possible output. A large proportion of the steam-steering gears produced have been fitted in the highest class of ocean, mad and passenger vessels. Messrs. Hastie have also supplied a number of sets of "Helé-Shaw Martineau" electric hydraulic steering gear to motor-driven ships, including the Asiatic Steam Navigation Co.'s *Jullandia*, the Hamburg-America Co.'s *Christian X.*, etc. A first, and largely experimental, gear of this type, chiefly as an alternative gear to the ordinary steam gear, also fitted by Messrs. Hastie & Co., was fitted on board the Orient liner *Orama*, built last year by Messrs. John Brown & Co., Ltd., Clydebank. On that vessel's maiden voyage to the Antipodes and back it was in use for 21,000 miles, the steam gear only being employed over a distance of 5,000 miles. From carefully noted tests on the voyage it was found that as regards sensitiveness, the maximum lag of the rudder behind the telemotor was 5 deg., when the rudder was moved quickly, while for slow motion it was proportionally less, and, as regards economy, the electric hydro gear saved 25 cwt. of coal per day, as compared with the consumption of the steam gear. Assuming that the ship is at sea 250 days per year and that the average price of coal is 22s. per ton, this means a saving of £350 per annum. In addition to this, there will be a saving in wages owing to the smaller amount of attention required (which consists of occasionally filling about six oil cups and cleaning the motor commutator once per week) ; and owing to the fact that the greater sensitiveness of the gear enables a straighter, and hence shorter, course to be steered, there will be a further decrease in the coal consumption of the main engines. From all accounts, in short, this type of steering gear is giving great satisfaction, as, in addition to the undoubted economy which it effects, it is found to be a most reliable and powerful steering gear. Messrs. Hastie & Co. are at present fitting a set of this steering gear in a warship building for the British Navy.

Hawthorns & Co., Ltd.—Throughout the year this Company have also been well employed at re-boilering and marine repairs, and repairs, etc., at collieries and paper mills. During the year the firm have also constructed the following slipways :—(1) One of 2,000 tons capacity to the order of the Earnshaw Slipway and Engineering Co., Ltd., Manila. The cradle is arranged so that either one vessel of 2,000 tons displacement, or two independent vessels, each of 1,000 tons displacement, may be handled at one time. The cradle may also be divided into two if desired. (2) One set of haulage machinery for 800 tons slipway to the order of Messrs. Scott & Sons, Bowling. (3) One of 600 tons capacity to the order of the Amazonas Engineering Co., Ltd., Manaos, the gearing being made sufficiently powerful to handle 1,200 tons. Cradle of steel. (4) One set of haulage machinery for 500 tons. Slipway recently built by the firm to the order of the Chirket Hairie-Constantinople. There is also in hand one slipway of 1,000 tons capacity to the order of the Societa Anonima Bacina e Scali Napolitani, Naples, cradle of steel.

Menzies & Co., Leith, have had a record year on repairs and have done a large amount of work for the Admiralty, including the dry docking and overhauling of a section of the torpedo-destroyers belonging to the Second Flotilla and have several vessels of the First Flotilla at present in hand, this being a new venture at present developing on the East Coast. Prospects for next year—Good.

Yarrow & Co.—From list of launches elsewhere it will be observed that they have delivered no less than five torpedo boat destroyers for the British Admiralty, and they draw attention to the exceptional results of these vessels. The Archer and Attack were fitted with the firm's special arrangement of superheating, by which a considerably increased economy was obtained. The Firedrake, Lurcher and Oak were vessels of very high speed, the Lurcher attaining on the official 8 hours' full power trial the mean speed of no less than 35·34 knots, which constitutes a record, as no other vessel of any description has attained such a high speed during 8 hours under similar conditions. The Boiler Department has been kept very busy, having constructed the principal parts for 40 boilers for two Italian battleships. The complete boiler installations for two Chilian battleships are now in the course of construction, as well as other work of that description. They are constructing four new torpedo boat destroyers for the British Admiralty.

IRISH.

Messrs. Harland & Wolff's tonnage output for the year 1912 was rather below the average, owing to two of their slips being temporarily idle on account of extensions in progress. They, however, launched seven vessels of 77,591 tons and 39,000 I.H.P., the list including the Oxfordshire, 8,624 tons, for the Bibby Line ; the Desna, Darro and Drina, 11,500 tons, for the Royal Mail Steam Packet Company ; the Abosso, for the African Steam Ship Company, and the Appam, for the British & African Steam Navigation Company, Ltd., both the last-named being about 8,000-tons mail steamers for the service to West Africa. All these were twin-screw steamers ; and, in addition, Harland & Wolff launched the White Star triple-screw steamer Ceramic for the Australian service, this being perhaps the most notable vessel of the year, the approximate tonnage being 18,500, by far the largest vessel yet built for the Australian trade. During the past year, in addition to their construction of new vessels, Messrs. Harland & Wolff have had several important undertakings to carry out, particularly the extensive work on the White Star liner Olympic (45,000, tons), and the reconstruction of Lord Pirrie's fine large twin-screw yacht Valiant (2,000 tons). An interesting development during 1912 was the acquisition of the works of the London & Glasgow Engineering & Iron Shipbuilding Co., Ltd., at Govan, and Messrs. Harland & Wolff's association with the Burmeister & Wain (Diesel System) Oil Engine Co., Ltd. Their advent on the Clyde must be recognised as of great importance to the shipbuilding industry there, especially in view of their identification with the latest development in marine engineering. During 1912 Messrs. Harland and Wolff also established very large works at Bootle, Liverpool, and their large works at Southampton have been kept busy during the year. The outlook for the new year is very satisfactory, the Company being extremely busy in all departments and in each of their several works. Besides large passenger steamers of the highest class, they are busy with the construction of cargo steamers with oil motor propulsion, and at Belfast there are at present on the slips vessels of 10,000, 15,000, 35,000 and 50,000 tons each.

AMERICAN.

Buffalo Dry Dock Co., Buffalo, N.Y.—Small amount of repair work during the year but no building.

Chicago Shipbuilding Co., Calumet River, Chicago.—Repair and docking work, no vessels built.

James Davidson, West Bay City, Mich., are not building anything new, but have completed a large amount of rebuilding, repair work and dry-docking. Their dry dock has been constantly operated in repairing ships. Occasionally build small craft, such as a dump scow, for special purposes.

THAMES IRONWORKS CO.—Mr. F. B. Smart, receiver and manager of the Thames Ironworks, has been directed by the Courts to close the works entirely and offer them for sale by public auction. This decision has been arrived at by the Courts after several hearings, when the views of all those interested were fully expressed.

LIVERPOOL MARINE ENGINEERS AND NAVAL ARCHITECTS GUILD.—The 14th annual dinner of the Guild was held on the 14th of December in the Exchange Station Hotel, Liverpool. The function was largely attended and Mr. Jas. B. Wilkie (chairman of the Guild for 1912) presided. The Chairman, in referring to the *Titanic* Engineers Memorial Fund, spoke of the magnificent response which had been made to the appeal of the committee, the fund amounting to nearly £5,000. This large amount having been reached it was proposed to erect, by permission of the Liverpool Corporation, a monument at the Pierhead in lasting memory of the deed of the *Titanic* engineers in so bravely remaining at their duty. A number of very interesting speeches were delivered during the evening, notably by Prof. W. S. Abell, who referred to Liverpool's association with engineering and gave a short review of the advent of the steamship, and Mr. John Glynn, who drew attention to the remarkable progress Liverpool had made since the year 1815, when the first steamer arrived to trade up the river. Mr. David Jones and Mr. G. R. Brace gave some particulars relating to the Guild which, it was stated, had received £1,280 in donations and subscriptions and had about £1,250 invested. The funds of the Guild were administered at the minimum of expense and it was greatly desired to augment the funds in order that cases of distress could be alleviated more promptly as they arose. After Engineer-Commander Moorshead had given a short sketch of engineering training in the Royal Navy, the toast of the chairman was proposed and received with musical honours.

REVIEWS.

How to go to Sea in the Merchant Service. Compiled by Frederick H. Stitford (secretary Incorporated Thames Nautical Training College H.M.S. *Worcester*). Glasgow: Messrs. James Brown & Son. Price 2/6 nett.

This publication claims to be a complete practical, up to date and reliable reference book for parents and guardians, giving full particulars of all the training establishments, both for officers and lower ratings, lists of firms that take apprentices, with their terms and other useful information, and is certainly a most useful little work. Part I. deals with "Training for officers," and includes information on the sea and its prospects, apprenticeship indentures, outfit, eyesight tests, requirements for master's and mates' certificates, rates of wages, Royal Naval Reserve regulations, and qualifications for appointment to R.N.R., pilot service, etc., etc. A chapter is devoted to the marine engineer, the regulations for certificates, pay and a list of the firms taking shipbuilding and marine engineering apprentices being set out. Part II. deals with petty officers and seamen. The work contains a number of illustrations and is just the book for those who are about to embark on a sea career.

The Navy League Annual. Edited by Oliver H. Burgoyne. London: John Murray. Price 5/-

The 1912-13 edition of this publication has made its appearance, making the sixth year of issue, and is as usual full of very readable matter. It is divided into three parts. Part I. by the Editor, shows the progress of British and foreign navies and a glossary of naval terms. Part II. contains a number of articles discussing subjects such as "Britain in the Mediterranean," "Future of the French Navy," "German Naval Progress," "Recent progress in Naval and Marine Engineering," "Thoughts on the development of the ship type," etc., and Part III. contains a series of comparative statistical, dock and ordnance tables and a list of warships of the various powers. The letterpress is interspersed with a number of full-page illustrations of warships and many diagrams.

Pearson's Nautical Almanack and Tide Tables for 1913. London: Messrs. Imray, Laurie, Norie & Wilson, Ltd.

The 54th annual edition now before us contains all necessary information for navigators of steamships and sailing vessels. As in former years it is a wealth of information for daily use. The tide tables give the times and height of high water at numerous ports throughout the United Kingdom, and at a number of foreign ports. Comprehensive lists of lights and fog signals of the British Isles, the continental coasts of the North Sea, English Channel and Western Europe form an important feature of the Almanack, the information being very concise and intelligible. There is also a complete list of the buoys of the United Kingdom and another of fixed beacons. These are followed by general sailing directions for the principal ports of the United Kingdom, with an article on Pilotage, Magnetic Bearings and distances around the coasts and a table of passages and navigable distances for all parts of the world. The port charges of the British Isles have been compiled from original sources. This well-known annual is published in two editions, one at 1/- and another at 1/6, the latter being termed an extended edition, containing the list of lights, fog signals, port charges, etc.

Brown's Nautical Diary and Day's Work Book. Glasgow: Messrs. James Brown & Co. Price 4/- nett.

This diary for 1913 opens with rulings for an "abstract of voyages and chronometer rate journal entries." This is followed by the diary proper, which is interleaved with ruled paper. Spaces are reserved for the usual entries. The diary also contains the London daily tide tables, distances to principal foreign ports, table of velocity and pressure of wind, useful hints on the preservation of chronometers, etc.

The "Mechanical World" Electrical Pocket Book. The Mechanical World Pocket Diary. Manchester. Messrs. Emmott & Co., Ltd.

The 1913 editions of these useful publications have recently been issued at the very moderate price of 6d. each. Both volumes have been subjected to a thorough revision and many chapters have been rewritten and expanded. The "Pocket Diary" is in its 26th year of issue. Both volumes are full of information and are bargains at the price.

The Royal Navy List and Naval Recorder. London: Messrs. Witherby & Co. Price 10/-.

This publication, issued quarterly, was founded in 1878 by the late Lieut.-Col. Francis Lean, R.M.L.I. It aims to be a book of reference relating to the *personnel* of the Navy, both active and retired, and the ships of the fleet, and in the edition before us, which is the 140th number, the object has been fully carried out. In addition two articles are included on "The Current History of the British Navy and Foreign Navies," written by a well informed writer. To the naval man the work will be found of great service, while the layman will find much to interest him in its pages.

Industrial and Trade Notes.

THE CLYDE AND SCOTLAND.

(From our Own Correspondent.)

The Year's Work.—At the moment of writing, the output returns of shipbuilding and marine engineering on the Clyde and other Scottish centres are not fully available, but enough is known to warrant the expectation that a new record will be established in respect of tonnage launched and engine-power installed. The launches, up till the end of November, make a total for the eleven months of nearly 580,000 tons as compared with the previous highest figure of 550,870 tons—that of 1906—and with the 535,790 tons of the eleven months of last year. The total, up to the time of writing, is only short of the total output for the whole of last year by about 42,000 tons. During what has gone of December, the output nearly approaches this figure, and with a fortnight still to run, it is certain that the figure will be exceeded; thus making the aggregate for 1912 a larger figure than that for 1911. As last year's figures rose from 392,392 tons in 1910 to 630,583 tons, it will be seen that the increase within the two years has been enormous. It represents, indeed, the sharpest rise in output in the history of the river, and its only parallel is to be found in the great "slump" of 1908, as a result of which the Clyde figures fell within one year from 620,000 to 355,000 tons. And that the "boom" is not yet over is quite evident. During November a large number of important contracts were placed, and the year is closing with all the yards very busy and with a good demand for new tonnage. The feature of the returns as regards marine engines is the enormous output of Messrs. John Brown & Co., Ltd., Clydebank. It amounts to 178,500 i.h.p., which is easily the best on record for any firm on the Clyde, and one of the best on record for the whole world. Indeed it eclipses last year's record of the Vulcan Company of Stettin, which amounted to 166,250 i.h.p., as well as last year's figure of Messrs. Hawthorn, Leslie and Co., Messrs. Vickers & Co., and Messrs. Cammell, Laird and Co. Messrs. Brown's total includes the machinery of H.M.S. *Queen Mary* (battle cruiser), which was built on the Tyne by Messrs. Palmers. Last year Messrs. Brown and Co.'s output amounted to 104,550 i.h.p.

Motor-ship Contracts.—The Burmeister and Wain (Diesl system) Oil Engine Co. are to commence the manufacture of oil engines at their works in Lancefield Street, Glasgow, some time in February. The premises, it will be remembered, were purchased by the company about the beginning of October from Messrs. Harland & Wolff, who had acquired them a few months earlier from the London & Glasgow Shipbuilding and Engineering Co. At present the works are fully employed completing the contracts for steam engines which were on hand when the Belfast firm sold the premises. The Burmeister and Wain Co. have orders for their Glasgow works to supply oil engines for six vessels, including engines of 2,250 h.p. for two twin-screw vessels to be built by Messrs. Harland & Wolff for the East Asiatic Co. of Copenhagen. They have also to replace the present engines of three steamers of the company's fleet by motors of 1,900 h.p. and to provide engines of 3,200 h.p. for the Atlantic Transport Liner to be built at Govan by Messrs. Harland & Wolff. The three steamers which are to be converted into motor ships are the *Pangan*, the *Bandon* and the *Champon*, each of about 3,480 tons gross, which were built in 1909 by Messrs. Barclay, Curle & Co., Whiteinch, and are at present engaged in the East Asiatic Co.'s African trade. It is worthy of note that

when these orders have been completed the East Asiatic Co. will have a fleet of twelve motor vessels, all with Diesel engines of the four-cycle type. In addition to the two vessels of the same type as the *Selandia*, which have been ordered from Messrs. Harland & Wolff, and the three steamers which they are to convert into motor ships, they propose to have four vessels each of 10,000 tons. Two of these are at present under construction at Copenhagen. The three remaining ships of the fleet of twelve are the *Selandia* and the *Jutlandia*—already in service—and the vessel now being built at Copenhagen to take the place of the *Fionia*, which was sold to the Hamburg-Amerika Line.

Messrs. Mackie & Thomson, Govan, have received, by arrangement with Messrs. Harland & Wolff, an order to build two more steamers, each of about 7,000 tons carrying capacity. Last month Messrs. Mackie & Thomson were similarly favoured by Messrs. Harland & Wolff, who, as will be remembered, are now the occupants of the neighbouring yard of the London and Glasgow Shipbuilding Co. These four vessels will be the largest ever built by Messrs. Mackie & Thomson, and will probably be the last they will construct in their Govan yard, which will be taken over next year by Messrs. Harland & Wolff. Messrs. Mackie & Thomson will then remove to Irvine.

Messrs. Barclay, Curle & Co., Whiteinch, have received from the Canadian Pacific Railway Co. an order for two vessels of 12,000 tons each, to replace the *Lake Champlain* and the *Lake Manitoba*. The new vessels will have a speed of 16 knots. Messrs. Barclay, Curle & Co. built the *Lake Champlain* (7,000 tons) in 1900, while the *Lake Manitoba* (9,000 tons) was built on the Tyne in the following year.

Messrs. William Simons & Co., Ltd., Renfrew, who have during 1912 constructed five dredgers and five barges and pontoons of an aggregate tonnage of 7,643 tons and 12,080 i.h.p., have recently received orders for two dredgers and four barges to be employed at the Russian port of Vladivostock.

Messrs. Ramage & Ferguson, Leith, have been instructed by the directors of the Aberdeen and North of Scotland and Orkney and Shetland Steam Navigation Co. to build and engine a cargo steamer of about 400 tons.

Education and Engineering Practice.—The Glasgow Royal Technical College has now been put in poessession of H.M.s.y. *Vivid*, which will be used for the practical training of the students of the School of Navigation. The vessel has been lying at Devonport and Captain Brown, of the navigation department of the College, proceeded there and arranged for her removal to Glasgow. She arrived at the Tail of the Bank on 8th December and will be berthed in Greenock harbour until April, when she will be placed in commission for the summer session. The students and staff will then be installed on board, where they will practise the art of navigation and perform all the executive duties of a ship under the usual discipline. Professor Mellanby, of the chair of engineering in the College, in the course of a discussion on a paper recently read before the College Scientific Society on "Steam friction in turbine wheels," intimated that through the generosity of a local gentleman—who desired to remain anonymous—a gift had been made of sufficient money to install in the College laboratory turbine plant of a sufficient size to enable research work to be carried on which would prove of great value to the engineering world.

Motor Engines in Fishing Boats.—The marine superintendent to the Fishery Board for Scotland, in the course of his report on a visit paid to the Scandinavian Fisheries and International Marine Mofor Exhibition held in Copenhagen in July and August, states that in his opinion none of the methods shown for transmitting motor power to trawl winch or net-hanling capstan would prove satisfactory on board large trawlers or drifters. For small and moderate-sized fishing boats, or as an auxiliary in the large East Coast sailing boats motor power is highly desirable, and for this purpose a great variety of serviceable and suitable motor engines are available. It is, however, extremely doubtful whether steam can be successfully competed with by motor power in full-powered drifters and deep-sea trawlers. This position is owing partly to the present uncertainty of future prices for oil fuel and also partly to the fact that it will be difficult for some time at least to get men who are competent to run a Diesel engine to go to sea in a fishing boat.

TYNESIDE AND WEARSIDE.

(*From our Own Correspondent.*)

WORK on this river continues to be very brisk, and on both sides the shipyards and engineering works are fully employed.

Tyneside.

Messrs. Sir Wm. Armstrong, Whitworth & Co., Ltd., are still very busy, and have a considerable amount of work in hand at both yards.

Messrs. Palmers' Shipbuilding & Iron Co. have the battleship-cruiser *Queen Mary* nearing completion, and in addition they have a large amount of work, both at the Jarrow and Hebburn yards, and in the engine shops they have also a lot of repair work under way.

Messrs. Swan, Hunter & Wigham Richardson, Ltd., have a great amount of new work and repair work alongside the quay.

Messrs. Smith's Dock Co., Ltd., have a lot of repair work in hand, and with the opening of the new graving dock will be enabled to undertake more work still; they are also busy with a few ships repairing afloat.

Messrs. Brigham & Cowan continue to be very busy with repair work both in dock and afloat alongside quay.

Messrs. John Readhead & Sons, Ltd., have sufficient new work in the yard to last them for some months to come, the engine shops are also fully employed, and they have a great deal of repair work in hand.

Wearside.

Work in all the shipyards and engineering works on the river is still very plentiful, and a number of the firms will have had a record year.

Messrs. Wm. Doxford & Sons, Ltd., are still very busy and have all their berths fully occupied; they have had a splendid year and have orders which will keep them busy for a considerable time.

Messrs. George Clark & Sons, Ltd., are working night and day on sets of engines for ships building on the river, and have work in hand to last for some months.

Messrs. S. P. Austin & Son, Ltd.—Messrs. Austin have completed in the year 1912 four steam colliers of 8,420 tons gross register and 5,370 indicated horse-power, and but for labour troubles one more vessel with a deadweight carrying capacity of 5,250 tons for the London coal trade—perhaps the largest engaged in that trade—would have been added to the list. She will be launched towards the end of January. Frames of a collier for London owners are now being erected and frames are being turned for a collier for local owners. There has not been much repairing work during the last month owing to the vessels being too busily engaged in earning good freights. The total tonnage dealt with by this company in docking, painting, overhauling, damage and collision repairs during the year amounted to 250,000 tons gross register.

Messrs. MacColl & Pollock have any amount of work in hand for ships building on this and other rivers, and also a large amount of repair work under way.

Messrs. Osbourne, Graham & Co. continue to be very busy, have all berths fully occupied, and have enough work to keep them busy for many months to come.

Messrs. John Dickinson & Sons, Ltd., have in hand a considerable amount of work, and are working double shift, They have a number of orders for sets of engines for ships building on the river, which will take them some months to complete.

THE TEES AND HARTLEPOOLS.

(*From our Own Correspondent.*)

Middlesbrough.

Messrs. Sir Raylton Dixon & Co., Cleveland Dockyard, are very busy, having a very large amount of work on hand. It is expected that they will secure the contract to build a large cargo steamer for the China-Java-Japan Line that is in the market.

Messrs. W. Harkess & Sons continue busy on both old and new work. Nothing new is reported during the month, but plenty of work is in hand to keep them busy for a long time.

Messrs. Smith's Dry Dock Co., South Bank, are very busy on both old and new work. They are reported to have booked an order to build a small coasting steamer for Messrs. Howard, Smith & Co., Melbourne, for delivery about next July. Great progress is being made with the additions to the yard.

Messrs. Richardsons, Westgarth & Co., Ltd., have a large number of orders on hand, which will keep them going till about the end of the year. They are taking up the manufacture of several specialities that used to be made at the Hartlepool works of the firm. It is reported that negotiations are in progress to acquire a large quantity of land for the construction of a shipyard near the mouth of the Tees, on the north shore close to Seaton Snooks.

Stockton and Thornaby.

Messrs. Richardson, Duck & Co. are very busy, and are reported to have sufficient orders on hand to keep them busy during the year.

Messrs. Craig, Taylor & Co. continue to be very busy and are expected to secure an order for a cargo steamer that is in the market.

Messrs. R. Ropner & Son are reported to have booked an order for a cargo steamer for a continental firm.

Messrs. Blair & Co. are extremely busy and are reported to have sufficient contracts on hand for marine machinery to keep them busy well into 1914.

West Hartlepool.

Messrs. W. Gray & Co., Ltd., continue very busy, and are reported to have secured an order for a medium-sized steamer for foreign account, also a repeat order from Messrs. Strick and Co.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Harbour Dockyard, have sufficient orders on hand to carry them up to about next October. Mr. Stephen Furness, M.P., has been elected chairman of this company, in place of his uncle, the late Baron Furness, of Grantley.

Hartlepool.

The Central Marine Engine Works of Messrs. W. Gray and Co. are extending part of their works and offices. They are to build the machinery for the steamers recently booked by this firm.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Middleton Yard, have a large amount of heavy tonnage in the water, which perhaps constitutes a record for this firm; no new orders are reported during the month.

Messrs. Richardsons, Westgarth & Co., Ltd., continue to be very busy, and during the month they have secured the contract to build the engines and boilers for a cable steamer for the Eastern Telegraph Co., which will be built at Goole.

An interesting event took place on Dec. the 19th, when upwards of £200 in money and prizes was awarded to the successful apprentices under the works advancement scheme. T. Westgarth, Esq., Director, made the presentation.

The N.E.R. Strike, which just lasted a week, seriously interfered with the trade of the district, as several firms had either wholly or partially to close down.

THE HUMBER AND DISTRICT.

(*From our own correspondent.*)

Port of Hull.—Mr. Oswald Sanderson, managing director of the Wilson Line, a prominent member of the Hull Chamber of Commerce, has been appointed chairman (to succeed Mr. Bolton, J.P.) of the Chamber. He is well-known in all shipping circles of Great Britain, and is a director of the Suez Canal Co. His brother, Mr. Harold Sanderson, is the general manager of the White Star Line. Business in the docks is very brisk at present; a large number of steamers are in with full cargoes, from Bombay, Kurrachee, Calcutta, Buenos Ayres and Alexandria. The list of steamers for the month of January is unusually large. The graving docks are fairly well employed and the coal hoists are keeping very busy, loading for foreign and other ports. The Dominion liner *Norseman*, 10,000 tons gross, arrived from Australia to discharge 500 bales of wool, 1,000 cases of frozen rabbits and 3,000 tons of wheat. She is perhaps the largest steamer to enter the Hull Docks.

Record Coaling. As an instance of the speed with which coal can be shipped by means of modern appliances installed in the Hull Docks it may be mentioned that the s.s. *Zuid Holland*, loading at the conveyor at the Hull & Barnsley Company's Riverside Quay on 4th of Dec. took on board 2,700 tons of coal between 1 p.m. and 8.35 p.m., an average of 425 tons per hour.

Messrs. Earle's Shipbuilding and Engineering Co., Ltd. are exceedingly busy with the building of new tonnage and general repair work. The company's four patent slips are fully engaged, sighting bottoms and painting, etc. The outdoor work has been greatly affected with the heavy rains of late and high winds. The s.s. *Iran*, of Liverpool, has undergone very extensive repairs, in graving dock and otherwise, the vessel having been on fire, has necessitated the renewing of a large number of new plates, etc. The s.s. *Portsea*, on her trial trip, gave every satisfaction to her owners (Messrs. Brown & Atkinson, of Hull) and other builders.

Messrs. C. D. Holmes & Co., Ltd., Engineers and Boilermakers. This firm is exceedingly busy, working night and day, and running all the machines to cope with the many orders in hand. They are turning out weekly a set of triple-expansion engines about 80 h.p. nominal, and have had three trial trips this month. They are busy re-boilering vessels and are having a great demand for their patent compound winches for trawlers, which weigh about 4 tons when completed. The Company are building these winches for home and abroad and have a large number of orders in hand. The branch shop at Alexandra Dock has been fairly well employed and has had three vessels in graving-dock undergoing repairs.

Messrs. Amos & Smith, Engineers and Boilermakers. All departments of this firm are very busy. New orders for machinery and boilers keep coming in, both for home and export. The branch works, Alexandra Dock, are kept fully employed with graving dock work on several Wilson Line steamers, and outside steamers from other ports. The future looks well, as the firm is well booked up far into the incoming New Year.

Messrs. Stuart & Craig, Engineers and Ship Repairers.—have been fairly well employed during the last month on some expensive repairs to deck and engine-rooms on the following steamers: s.s. *Enid*, s.s. *Willy*, s.s. *Alderbarran*, s.s. *Cardiff Hall*, s.s. *Windsor Hall*, s.s. *Arthur*. Several enquiries have been received from shipowners for repairs, etc.

Thomas Tate, Engineer and Boilermaker.—has had a fairly good month on the following coasting steamers: s.s. *Spurn Point*, boilers and machinery opened out, tail shaft drawn for Lloyd's survey, new propeller fitted, and crank shaft lined up; s.s. *Owen Tudor*, new blades fitted on propeller boss, and shaft skimmed up; s.s. *John Blake*, new stern bush fitted, shaft skimmed up and crank shaft lined up; s.t. *Midge*, new stern bush fitted.

Hull Central Dry Dock Co., Ltd., have had their own graving dock fairly well engaged with local and other steamers, but as this report goes to press they are now extremely busy and have had to engage the public graving docks. They have a very large steamer to do repairs on, *viz.*, the Dominion liner *Norseman*, while the Company anticipate a great amount of work in the New Year.

Messrs. North-East Coast Engineering Works (Hull), Ltd. have had the following steamers undergoing repairs during the month: s.s. *Veturia*, large repairs executed on boilers and other repairs on deck; s.s. *Grainton* and s.s. *Hawthorn*, general repairs to ship and machinery; barque *Sunlight*, general repairs; tugs *Chester* and *Winchester*, ordinary overhauling. Several enquiries from local and outside shipowners have been received.

Messrs. Woodall & Co. have had a good month in general overhauling, etc., and in forgings for ships' stems and stern posts to the order of several small shipyards in different parts of England. The Company has also received work from the Hull Corporation and L.C.C.

Messrs. Cooper & Co., Ltd., are busy with general repair and graving dock work, all departments are fully employed, including the moulding shop, on their patent propellers, to supply the demand received from nearly all the ports in Great Britain. The firm's own graving dock is well employed with coasting steamers and is well booked ahead. The branch shop at Alexandra Dock is fairly busy on several steamers, notably the R.M.S.P. *Parana*, opening out for Board of

Trade and Lloyds Surveys and the renewing of several parts.

Messrs. Cochrane & Sons, Ltd., have had a prosperous year having built and launched thirty-six vessels, and are still booking orders for trawlers, drifters, coasters, etc. They have work that will occupy them the whole of 1913.

MERSEY AND MANCHESTER SHIP CANAL.

(From our Own Correspondent.)

ENQUIRIES have been very numerous during the past month and it is expected that new tonnage will shortly be placed locally.

Messrs. Cammell, Laird & Co.—All departments have been fully employed, chiefly upon the completion of the various large contracts in hand. The past year has been a notable one, due to the fact that there has been a revival in the number of important vessels launched and completed, amongst which may be mentioned the 32,000 Floating Dock for Portsmouth, H.M.A.S. cruiser *Melbourne*, H.M. super-"Dreadnought" *Audacious* and the Norwegian liner *Kristianiafjord*, also the placing of two large steamers for the P. & O. Company. These latter have been named *Khiva* and *Khyber*. The *Melbourne* has completed fitting out and is awaiting departure to Portsmouth. The *Audacious* has made rapid progress, great activity prevailing on board; the funnels and gun mountings, etc., are being placed in position, the latter being supplied by Messrs. Vickers, Ltd. The *Kristianiafjord* is receiving her machinery in the west basin, while her sister ship is rapidly approaching the launching stage. The Isle of Man steamer and the meat barge *Doon* will be ready for launching early in the year. The propelling machinery for H.M.S. *Iron Duke* is making rapid progress and is being shipped to Portsmouth. Improvements and additions are being made to the offices and plant during the Christmas holidays and a year of still greater activity is confidently expected. The Norwegian steamer *Lovstakken* is still in dry dock undergoing heavy repairs, while the Peruvian Transport *Iquitos* has left after undergoing complete overhaul. The Norwegian steamer *Fane* has had extensive repairs executed in the West Float, while several steamers are in hand on the Liverpool side.

Messrs. H. & C. Grayson.—An important contract has been placed with Messrs. Grayson in the case of the steamer *Masterful* of the Powell Line, which has been purchased by Messrs. Braun & Blanchard, of Punta Arenas, through their Liverpool agents, Messrs. Duncan & Fox. Extensive alterations will be carried out to fit her for cargo and passenger service between Punta Arenas and Valparaiso. Two steamers are already on the service and the *Valdivia* renamed will augment the service. This steamer is 280 ft. long, 36 ft. beam and 19 ft. 8 in. deep, has triple-expansion engines, electric light and has accommodation for 60 first-class passengers. Submarine signalling is also fitted. The steamer *Star of New Zealand* has left after having collision repairs. The *Star of England* and *Pioneer* have been in hand on the Birkenhead side.

The Ship Canal.—In a paper read before the Manchester Statistical Society recently by J. S. McConochy, the economic effect of the Canal was reviewed. Some figures given illustrate the beneficial effect to the district. It was estimated that the saving to the whole of Lancashire and Cheshire effected was £1,500,000 per year. In Manchester and Salford a pronounced rise has taken place in the rateable values, while a great impetus has been given to the erection of houses and factories. It was also remarked that a great saving in the importing of cotton and frozen meat had been effected. The large silo granary being constructed by Henry Simon, Ltd., at the east end of No 9 Dock, will have a capacity of 40,000 tons of grain in the bins. Two subways run the whole length of the north and south docks into the basement of the silo, in which are six conveyor bands, each with a capacity of 200 tons per hour. The grain is elevated, weighed, dust and foreign matter extracted. Two 80-inch diameter fans supply air for extracting dust, while the power in the elevator is derived from motors of a total of 1,500 H.P. Coal export to Irish and Mediterranean ports has been largely on the increase, while prices have been good at the modernized tips at Partington.

Fishguard Harbour.—The Great Western Railway Co. are seeking powers by a new bill to carry out an extensive scheme of improvements to this harbour, thus making it a safe haven for vessels in all weathers. The existing northern breakwater is to be widened and lengthened, each side being faced with concrete blocks, a landing stage will also be constructed on the sheltered side. The Sands Mole is to be abandoned for a distance of 176 yards from its termination, and an embankment is to be constructed from the point to the quay side near Goodwich Railway Bridge. The portion of the foreshore thus reclaimed will be used for works to construct concrete blocks for the northern breakwater. The extension of the Irish Quay to join the Ocean Wharf is also included in the scheme, which will employ some 500 men for three years.

White Star Line.—With the launch of the *Ceramic* at Belfast on the 11th December another notable addition has been made to this Company's Australian fleet. This vessel has triple screws and has combined reciprocating and turbine machinery, and is of 18,000 gross tons. The dimensions of this vessel are—length 675 ft., breadth 69 ft., 3 in. There will be boats for all; a total of 820 passengers will be carried, while the double bottom extends right fore and aft. It is reported that oil fuel will be carried in the double bottom and sides of the *Olympic* and also in the new steamer building, thus utilising the space between the inner and outer skins.

The Cunard Line.—It is understood that great effort is being made to introduce novelty in the method of the decorations of the various public saloons and private suites on the *Aquitania* building at Clydebank. Experts of the highest repute have been engaged to produce effects unlike those possessed by any other liner. Captain R. A. Warr has retired from the position of Commodore of the Cunard Fleet, having made his last voyage on the *Campania*, which reached Liverpool on November 27th. Captain Warr is sixty-three years of age and has been thirty-three years in the Company's employ and has crossed the Atlantic 550 times. He was presented by the passengers with a silver tea and coffee set, also an address. He is succeeded by Captain J. C. Barr, of the *Caronia*.

Liverpool Engineering Society.—At the meeting of this Society on November 27th a paper on "Vagaries of Engineering Practice" was read by Mr. J. Hamilton Gibson, M.I.N.A. The great divergencies of opinion regarding engine parts, type of boiler, propeller and auxiliaries was touched upon, and as a general rule Mr. Gibson stipulated that (1) The required duty should be clearly defined, (2) The precise conditions of service stated, (3) The machinery of fewest parts should be designed to carry out the conditions On December 4th Mr. E. J. Rimmer delivered an address on "The Legal Effect of an Engineer's Negligence or Mistake in Directing the Construction of Works.

Blue Funnel Line.—The largest vessel yet built by Messrs. Workman Clark was launched on December 7th for this Company for their Australian service, and was named *Nestor*. The dimensions are—length 580 ft., 65 ft. 3 in. beam, with a depth of 44 ft. 6 in., and a gross tonnage of about 14,500 tons. Triple-expansion engines driving twin screws will be supplied with three double-ended and two single-ended Scotch boilers under forced draught. A sister ship is now on the stocks.

SOUTH OF ENGLAND AND ISLE OF WIGHT.

(From our Own Correspondent.)

Messrs. J. I. Thornycroft & Co., Ltd., Woolston Works, Southampton.—On the 14th of last month the firm held their annual dinner, and in the absence of the general manager (Mr. H. Callaway) the chair was occupied by Mr. S. W. Barnaby (technical director), who, following the usual custom at the after-dinner speech, referred to the work completed and in hand. He said "that during the year 1912 they had launched only one destroyer, the *Hardy*, and had had no steam trials; nevertheless they had never had a busier year. A few days before their last annual dinner they received an order from the Admiralty for four destroyers, and had since received orders for two more, and at present seven of these vessels were in hand. Altogether the work in hand amounted

to 10,000 tons displacement, and 190,000 i.h.p., employing 8,000 men, all of which figures constituted a record for the firm. In addition they had made a number of Diesel engines for generating sets to battleships, and had done a large amount of repair work and work of a general character. They had also completed the detail designs for destroyers building by them licensees in Italy and Russia. Official trials of two of these vessels for Italy had given a speed of 35 knots, and for the destroyers for the Black Sea they had guaranteed a speed of 34 knots, and fully expected to get 35 knots. The usual toasts were proposed and duly honoured and a good musical programme brought an enjoyable evening to a close. The following is an account of work in progress at the above works. Satisfactory progress is being made with H.M. ships *Hardy*, *Para*, *Porpoise*, *Unity*, *Victor*, *Dasher*, and *Drake*. H.M. paddle tugs *Sturdy* and *Strenuous*. The second of these tugs was launched early last month. Shallow draught ferry steamers. Both vessels were shipped to Calcutta early in December. Work is proceeding satisfactorily on the Diesel engined yacht. Passenger and cargo steamer for Trinidad. The shell plating of above is nearing completion. Composite cargo vessel for Peru. Engine seat complete. Good progress has been made with the motor passenger vessel for New Zealand and the lightships for Trinity House. The keel for the Canadian Customs cruiser was laid at the latter end of last month.

Messrs. J. Samuel White & Co., Ltd., East Cowes, Isle of Wight.—The gross tonnage launched by the above firm during 1912 amounts to 4,476 tons with a total i.h.p. of 56,476, and embraces torpedo boats, destroyers, shallow draught vessels for special service and special steam boats for warships for British and foreign governments. The gross tonnage and i.h.p. of work on hand is 6,839, and 104,901 respectively. These vessels are not yet launched.

The R.M.S.P. Co. have disposed of their steamer *Atrato*, and she left Southampton for Newcastle-on-Tyne on the 18th of last month. She was employed for many years on the company's West Indian mail service, and was a "crack" ship in her day. She was built in the year 1888 by Messrs. Napier & Co., and has a length of 400 ft. and a beam of 50 ft. She has triple expansion engines, the cylinder diameters being 42 in., 66 in. and 92 in. respectively. The stroke being 66 in. This is the seventh vessel the Company have disposed of within the last year or two.

Messrs. Day, Summers & Co., Ltd., Northam Ironworks Southampton.—The new s.y. *Jason* (750 tons), which the firm are building for Mr. Frank Bibby, has completed satisfactory steam trials and will be handed over to the owner early this month. The 60-ton sheer legs and pontoon for Messrs. Pearson & Sons are well advanced, and the machinery for the 130-ton sheers for Spain is also well forward. The tugboat *Don Roberto*, recently built for Messrs. Liebig's Extract of Meat Co., was shipped to South America last month. The s.y. *Savmara* is at the yard going through survey in addition to considerable alterations to her cabins. The paddle steamer *Princess Helena*, for which the firm have built a new boiler, will shortly come to the yard to have same fitted. A large amount of repair work has been carried out to the Tilbury Contracting and Dredging Co.'s dredger *La Loire*, also to a large hopper barge for the same owners which had been in collision.

THE THAMES.

(*From our Own Correspondent.*)

Port of London Trade.—The Port Authority has issued its third annual report to March 31st last, and it proves interesting reading. Summarizing the same, foreign shipping entering or leaving the port increased in the year by 445,441 tons. The coastwise tonnage was, however, lower by 345,550 tons. Shipping entering the wet docks showed an increase over the previous year of 208,090 tons. That entering the dry docks was 77,000 tons less than in the preceding year, which is attributed to the strikes that occurred. London heads the list of ports in the United Kingdom of values of imports and exports with £368,202,536. The gross profit made by the Authority was £1,115,304. The whole subject is interesting and goes to show the wisdom of the change that has been taking place in the last few years in this department.

The Watermen's Enquiry.—This matter opened at Westminster under the presidency of Sir Robt. Romer, and the proposal is to allow unlicensed watermen with a qualifying period of two years to take up their duties. The strike last year has brought the question to a head, there having been no lightermen available during this period and London was said to be in danger of a famine. The prices asked are said to be too high also, and holding the key to the position the men can upset all trades. Some of the conditions attached to the trade have savoured of the ludicrous and are fairly certain to come in for drastic amendment.

Shipping Reports. The Orient Company, like other lines, has had a good year, the credit balance for the year being £232,000 against £174,751 for the year previous. In the case of the P. & O. Co., heavy losses had to be met but the Company's profits enabled it to show a splendid result. This Company will shortly have one million capital invested in a new business, the Cape Australian line, the chairman said at the meeting.

Thames Steamboats Co. This Company reports a bad season for trading, and considering the weather that prevailed this state of things is not greatly to be wondered at. The Company has had to meet all the difficulties that the Council had, but having bought their boats at scrap price they have been in the fortunate position of being able during the year to sell two at a profit, the vessels, so the report says, being unsuitable to the traffic and a more profitable boat has been acquired of smaller size. By the sale the Company was enabled to pay a dividend of 10 per cent. The chairman pointed to the pier tolls that had to be paid as being against the Company. The present position shows, however, a renewal of all the old troubles the former Company had with the previous boats, and the Council with the present ones.

The London Sailors' Home.—There is no one acquainted with dockland who does not know of the existence of this institution in Well Street, Founded in 1830 the home is now compelled to ask for £10,000 to complete alterations required by the County Council. As there are no funds available for the purpose an appeal is made to the public with Lord Brassey as president of a committee which includes such names as Prince Louis of Battenberg, Lord Charles Beresford, Sir Thos. Sutherland and Sir Owen Philipps, so we may almost rest assured, with such support the appeal will be successful.

NORTH-WEST OF ENGLAND.

(*From our Own Correspondent.*)

Barrow-in-Furness.—The shipbuilding industry at Barrow remains in a very strong and active position, and builders have in hand a very large amount of work and have the chance of booking several further orders if they could undertake to complete delivery in the time specified for the completion of the work. Their chief difficulty is in the fact that they cannot get enough workmen to fill up the vacancies in the several departments of their works. Shipbuilders all over the country find themselves in much the same position, and as a consequence there are very few men available for vacancies which may arise. But the chief cause of men not coming to Barrow as freely as there is need for them is that the housing accommodation in the town is very inadequate, and many men when they come to work in Barrow, finding they cannot get houses in which to bring their families go away again and find work in other places. The demand for houses is such as would need at least 500 new workmen's dwellings being built at once, and the way shipbuilding is developing in Barrow at present makes it certain when these 500 houses are provided another 500 will be shown to be wanted to accommodate the constantly increasing number of hands employed by Messrs. Vickers, Ltd. The Corporation of Barrow have now taken up the question, and it seems certain that a municipal housing scheme will be adopted shortly. There is plenty of available land for the purpose. Private builders are doing something in providing additional houses, but the speed at which they are moving is not adequate to the requirements of the town, and the Corporation will take up the leeway before many weeks have passed. Messrs. Vickers, Ltd., some time ago built 1,000 houses for their workmen on Walney Island. It is now shown they

need quite as many more houses, and they prefer these should be provided by outside capital in order that they may concentrate their enterprise in adding further to the size and capacity of their works. Plans have already been approved for the erection of new buildings, both in the shipbuilding and engineering departments, in order to enable the firm to undertake more work and be capable of getting through the same in the quickest time possible. The very best and most modern tools have been put down in their shops, and nothing that capital and enterprise can do has been left undone to make the naval construction works at Barrow as complete as possible. The firm has offered to back up the Corporation in their housing scheme by guaranteeing them a certain rate of interest on their investment for a period of years. It is known that the firm have orders in hand and in perspective which will keep them busily employed in all their departments for at least seven years, and the prospects are they will be kept busy for an even longer time than this. Barrow bids fair to become one of the busiest towns in the country engaged in the shipbuilding and engineering trades. Messrs. Vickers, Ltd., have a wage bill to face at Barrow every week of about £30,000, and this is growing week by week, and the policy of the firm is such as to give the assurance that it will continue to grow for a long time to come.

Progress of Work.—Marked advancement has been made in the work of building the British battleship *Delhi* as their Turkish battleship *Reshad V.*, as the firm are anxious to get these vessels launched at as early a date as possible, as their places on the slipways will be wanted for other "Dreadnoughts" required by the British Admiralty as well as by foreign Powers who are anxious to strengthen their fleets out of British shipyards. There is room in the Barrow shipyard to put down five or six super-"Dreadnoughts" at one time, but before this can be done it will be necessary for the other departments of the yard to be so strengthened that the incidental work of preparing the material for constructive purposes can be done. This work is gradually going on, and thus by degrees the firm will be able to add to the number of orders they can undertake at one time. The Turkish battleship will be the first to be launched early next year, and the *Delhi* will soon follow her in the water. They will be both fitted up at the Buccleuch Dock wharf under the two-hundred-ton crane, but the berth is now occupied by the Japanese battle-cruiser *Kongo*, which is making rapid progress. She is to leave Barrow in March or April next for her trials, and quite an army of men in all departments are employed on her night and day. She will be the first ship built at Barrow to be fitted up with 14-in. guns as her main armament. These guns are put through very effective and successful tests at Messrs. Vickers' Eskmeals range. The Brazilian monitors *Javery*, *Solimoes* and *Madeira* are proceeding satisfactorily in construction. They are being built broadside of Walney Channel, one behind the other, and will be launched that way when ready for the water. They are meant for service in the Brazilian rivers. The two cruisers of the Town class have been laid down, and are already getting into shape. The keel of the Admiralty oil-tank oil-driven steamer for the carriage of oil fuel to warships out at sea has been laid, and the work of her plating will soon be commenced. The order has been at last booked for a floating dock for the Argentine Government, and this craft, which is to lift 1,500 tons, will soon be put in hand. Messrs. Vickers, Ltd., are busier than ever they were in the construction of submarines for the Admiralty, and although this department has been largely increased it is now filled to its utmost capacity.

The Year's Production. Messrs. Vickers' return of ships and engines built during 1912 shows that the total tonnage launched was 52,860, and the total horse-power of engines built 136,750. The vessels launched during the year include Sheerness cratt No. 96, submarine water tank and salvage vessel; H.I.J.M.S. battle-cruiser *Kongo*; Brazilian tug *Guarany*; floating ship dry dock, *Duke of Connaught*, for Montreal; and various small vessels.

Engineering. Some idea of the activity of the Vickers' firm in the marine engineering department may be formed when it is stated that over 200,000 shaft horse-power is now under construction in their shops. This includes not only the engines for the ships the firm is building but of the Brazilian battleship *Rio de Janeiro* building at Elswick, and a set of powerful engines for Japanese battleship building in the Far East. Further than this, the firm has made great progress with the work of building oil engines and are now constructing motive power of this class for Admiralty and other classes of ships. Indeed, a new department at the Barrow yard for oil-engine construction is being prepared, fitted up with new machinery specially designed for the purpose. There are innumerable orders in hand for gun mountings for the home and other governments.

Cost of Material.—There has been a marked advance in the price of material used in ship construction. Ship plates are now at £8 10s. and boiler plates at £9 5s. to £9 10s., and it is difficult to get deliveries as makers are so busy.

Hematites.—The hamatite iron trade is passing through a great boom, and prices are at 86s. 6d. for mixed Bessemer Nos. nett f.o.b., and warrant sellers are at 83s. cash. Stocks are low, and the production is much below the actual demand, as the supply of coke is less than the needs of smelters.

BELFAST.

(*From our Own Correspondent.*)

Messrs. Harland & Wolff, Ltd.—On 11th December a triple-screw steamer of 18,000 gross tonnage was launched from the north yard of the Queen's Island. This vessel, which has been built to the order of the White Star Line for their Australian service, is the largest vessel launched in Belfast during the past twelve months. She is also a notable vessel in view of the fact that she will eclipse in point of size any vessel trading to Australia. She is 675 ft. long, by 69 ft. beam, and will have very extensive passenger accommodation in addition to large cargo capacity. The machinery consists of two sets of reciprocating engines driving the wing propellers, the centre propeller being driven by a low-pressure turbine. On the slip vacated by the *Ceramic* the keel of a steamer of 17,500 tons for the Red Star Line has been laid down.

The caulkers working at the *Olympic* expressed dissatisfaction with the rate of wages paid for this work, which they contended was of a difficult nature and carried on under congested conditions. A settlement of the dispute was arrived at by a grant of 7½ per cent. increase. Platers also approached the firm with regard to the question of increased remuneration for repair work, and an advance of 40 per cent. on current rates for new work was agreed to. The alterations and overhaul of Lord Pirrie's steam yacht have been completed, and the vessel has left Belfast for Southampton.

Messrs. Workman, Clark & Co.—This firm recently launched a twin-screw steamer of 15,000 tons named *Nestor*, which they have built to the order of Messrs. A. Holt & Co. The launching of this vessel was an event of importance, it being the heaviest yet sent from Messrs. Workman, Clark & Co's ways. They finished during the month the fitting-out of the new Bucknall liner *Kentucky*, and after a successful series of trials in Belfast Lough the vessel left for Cardiff. She has a gross tonnage of 6,600, and the propelling machinery consists of a set of quadruple-expansion engines supplied with steam by three large single-ended boilers working under forced draught. They have completed the repairs to the *Ardandearg*, the vessel leaving for Glasgow on 14th December.

The Harbour.—There has been a considerable increase in shipping in the port during the eleven months commencing 1st January last. The total tonnage which entered the port during that period was 2,691,229 tons, being an increase of 183,482 tons over the corresponding period of 1911. The Harbour Commissioners have invited tenders for a new 120-ton crane, to be electrically driven. This is to replace the old collapsed 100-ton steam crane, to which reference was made in previous issues of THE MARINE ENGINEER, and which the Commissioners previously contemplated rebuilding. In view of the ever-increasing size of vessels building in Belfast there is no doubt that the Commissioners' decision is a wise one. It is quite possible that the crane eventually ordered will exceed 120 tons, for influential representations have been made to have a crane of much bigger power erected. The Commissioners have never been slow to accept advice from those best qualified to speak on the subject of shipbuilding requirements in the port, and it is to be hoped that this occasion will not prove an exception to the rule.

Dublin.—The shipbuilding business which has for some years past been conducted on the Liffey by Messrs. Walter Scott and John Smiley, trading under the name of the Dublin Dockyard Company, has been floated with a capital of £80,000. The company has been highly successful in its operations, both in the building of new vessels and in repair work, and there is every prospect of a long continuance of the present prosperity. They have several important contracts in hand, which will ensure a busy spell for some time ahead.

LAUNCHES AND TRIAL TRIPS.

LAUNCHES English.

Genevieve.—On November 22nd, Messrs. Osbourne, Graham & Co. launched from their yard at Hylton the steel screw steamer *Genevieve*, which is the sixth vessel they have specially constructed to the order of Fernand Bouet, Esq., of Caen, and is a sister ship to the *Demse*, which was recently sent to sea. The vessel is a single-decker 270 ft. by 36 ft. 6 in., built to carry 2,400 tons on a very shallow draught, and is of the self-trimming collier type. Arrangements are made for a large amount of water ballast. Rooms for the captain and officers are tastefully fitted out in hardwood and are of large size. The vessel is fitted with the most modern appliances for economical and quick working of cargo. She has been constructed to Lloyd's highest class and also complies with the requirements of the French Law. Machinery has been supplied by the North-Eastern Marine Engineering Co., Ltd., Sunderland, to drive the vessel a speed of 10 knots loaded. During construction the hull and engines have been under the supervision of Messrs. Swan & McFarlane, of Newcastle-upon-Tyne.

Kristianiafjord.—On November 23rd, Messrs. Cammell, Laird & Co., Birkenhead, launched the steamer *Kristianiafjord*, which they have built to the order of the Norwegian-Amerika Line. The vessel is primarily intended for the large emigrant trade between Norway and America. By running direct she will enable Norwegian emigrants to make the voyage without transhipping at any ports. The *Kristianiafjord* is a steamer of 12,000 tons gross, 530 ft. in length, and 61 ft. in breadth. She has accommodation for 130 first-class, 200 second, and 700 third-class passengers, and has a speed of 16½ knots.

Channel Trader.—On November 23rd, there was launched from the shipbuilding yard of Messrs. Smith's Dock Co., Ltd., South Bank-on-Tees, a finely modelled steam cargo vessel named *Channel Trader*, 210 ft. long. She will be fitted with triple-expansion engines, having cylinders 17 in., 28 in. and 46 in. by 33 in. stroke, with one single-ended boiler. The vessel is the first of two Messrs. Smith are building for the London-Welsh trade of Messrs. Furness, Withy & Co., Ltd., and is fitted for the rapid handling of cargo. Messrs. Wailes, Dove & Co.'s "Bitumastic" enamel has been applied throughout the bunkers and their patent "Bitumastic" covering to the engine and boiler-room tank top.

John Shaw.—On November 23rd, Messrs. W. Harkess and Son, Ltd., of Middlesbrough, launched the new steamer *John Shaw*, which they have built for Messrs. Allen, Adams and Co., of Southampton. The vessel is a self-trimming collier of large cubical capacity, designed to carry 2,300 tons on very shallow draught. She is intended for the owner's Goole and South Coast coal trade, and is fitted with a full complement of deck machinery and gear to enable her to handle cargoes with the utmost despatch. Her engines are being built by Messrs. MacColl & Pollock, Ltd., Sunderland, and will be capable of driving the vessel a speed of 10 knots loaded.

Helmsmuir.—On November 23rd, Messrs. Wm. Pickersgill and Sons, Ltd., launched from their yard, Southwick, Sunderland, the above steel screw steamer. Her dimensions are: Length, 391 ft.; breadth, 52 ft.; depth, 25 ft. 6 in. She has been built under special survey to take Lloyd's highest class as a single-deck steamer with long bridge, and is fitted with cellular double bottom throughout for water ballast, in addition to which the after and fore peaks are fitted as ballast tanks. She is provided with five large cargo hatches, each of which is fitted with double derricks capable of raising heavy weights, derrick posts being fitted where necessary. The vessel will be rigged as a fore and aft schooner with steel lower masts, and wood telescopic top masts. Nine steam winches will be supplied by Messrs. J. Lynn & Co., and a special quick warping windlass by Messrs. Emmerson, Walker and Thompson Bros. The steam-steering gear is by Messrs. J. Roger & Co., Stockton, and is fitted abaft the engine-room, and controlled by means of rods and bevelled wheels from wheelhouse on bridge. The captain and officers are berthed in deckhouses on bridge, together with a large mess room tastefully fitted out in oak. The crew and petty officers are berthed in the forecastle. The machinery and boilers are being supplied by Messrs. J. Dickinson & Sons, Ltd., Sunderland, the engines having cylinders 26 in., 42 in., 71 in. by 48 in. stroke, and the three specially large boilers are of steel, with a working pressure of 180 lbs. The steamer has been built to the order of Messrs. The Strath Steamship Co., Ltd., Cardiff, and during construction has been under the supervision of Capt. Tedford and Mr. Cambridge. Messrs. Wailes, Dove & Co.'s "Bitumastic" enamel has been applied throughout the engine and boiler room tanks, and their patent "Bitumastic" covering to the tank tops.

Escalona.—On November 25th, the s.s. *Escalona*, to the order of Messrs. W. Lowden & Co., of Liverpool, was launched by Messrs. Short Brothers, Ltd., Pallion, Sunderland. Her principal dimensions are: Length, 383 ft.; beam, 50 ft., and depth moulded, 27 ft. 8½ in. She is built on the single deck principle to the Isherwood patent system of ship construction with poop, long bridge and topgallant forecastle, and will take the highest class with Lloyd's and British Corporation. The double bottom is fitted throughout the vessel for the carriage of water ballast and for cargo or fuel oil, and the bridge clear of engines and boilers is divided into ten separate tanks for the carriage of oil fuel and oil cargo in bulk. Fore and after peak tanks are available for water ballast. After launching cylindrical oil tanks will be fitted in holds to the system patented by C. P. M. Jack, Esq., of New York, for the carriage of oil in bulk. Accommodation for officers, with saloon decorated in polished hardwood, is fitted in house in bridge deck with house for captain above, and with a chart and wheelhouse on top of captain's house. The engineers are berthed in houses abreast of engine casing and the crew in the poop. Three steam winches and two derricks are fitted for lifting stores on board and for warping ship, steam windlass and steam steering gear on bridge deck in engine casing driven from wheelhouse and connected by steel wires to quadrant on rudder head, with hand gear and rudder brake on poop. The propelling machinery will be put on board by Messrs. George Clark, Ltd., of Sunderland, and consists of triple-expansion engines with cylinders 25 in., 41 in., 68 in. diameter and a stroke of 48 in., driven by three large multitubular boilers of 180 lbs. pressure. The boilers are arranged for burning oil fuel. During construction the hull and machinery have been under the supervision of Mr. R. J. Williams and Capt. Dougall, of Liverpool, superintendents to the owners.

Cyrena.—On November 25th, Messrs. William Gray and Co., Ltd., launched the handsome steel screw steamer *Cyrena*, which they have built for Messrs. The Anglo-Saxon Petroleum Co., Ltd., London. She will take the highest class in Lloyd's register and is of the following dimensions, *viz.*:—Length, overall, 299 ft.; breadth, 39 ft., and depth, 22 ft. 4 in. She is designed for the carriage of case oil and is a handsomely modelled vessel of the single-deck type with engines aft, having long poop, short bridge and topgallant forecastle. Tasteful cabin accommodation will be fitted up in the poop for captain, officers, engineers and the crew are berthed in upper and lower forecastle. The hull is built with deep frames, cellular double bottom and large fore and aft peak ballast tanks, nine steam winches, steam-steering and hand-screw gear aft, patent direct steam windlass, patent vertical donkey boiler, stockless anchors, twin masts, telescopic top masts with fore and aft rig, and all requirements for the rapid loading and discharging of cargo. The machinery has been made at the Central Marine Engine Works of the builders. It is of the triple-expansion type, having cylinders 22 in., 36 in. and 60 in. diameter, with a piston stroke of 39 in., and will be placed in the after part of the vessel. There are two large steel boilers fitted with Howden's system of forced draught, adapted to work at a pressure of 180 lbs. per square inch. The main and donkey boilers are being fitted with an oil fuel burning installation. An evaporator and duplex

feed and ballast pumps of the "CMEW" type will be fitted. The vessel and machinery have been constructed under the superintendence of the owners' surveyors.

Swindon.—On November 25th, Messrs. Craig, Taylor and Co., Ltd., launched from their Thornaby shipbuilding yard, Thornaby-on-Tees, a very fine screw steamer of the following dimensions :—430 ft. by 55 ft. 6 in. by 36 ft. 7½ in. moulded to bridge deck. She is built of steel on the single-deck type, with poop, long bridge and topgallant forecastle, to Lloyd's highest class, but has in addition to same increased scantlings to the owners' special requirements. She has large water ballast capacity in double bottom fore and aft, and in peaks, and is equipped with patent direct steam windlass with quick-warping ends, steam-steering gear, large multitubular donkey boiler, six special steam winches, double derricks, stockless anchors, very large hatches, and all the latest improvements for rapid loading and discharging. The masts and funnel have been arranged to suit Manchester Ship Canal requirements ; shifting boards are fitted throughout for the carriage of grain cargoes, and all has been arranged to a complete and full specification. The accommodation for captain, spare rooms and officers is neatly fitted up in deckhouses amidships on bridge, the engineers being in deckhouses alongside engine casing, and the crew in the poop, with special mess-rooms, bath rooms, etc. The whole accommodation has been arranged on a very ample scale, giving each compartment extra large cubic and floor space. Her engines have been constructed by Messrs. Blair & Co., Ltd., Stockton, the cylinders being 28 in., 46 in., 75 in. by 48 in. stroke, with three large boilers working at 180 lbs. pressure. The vessel has been built to the order of Messrs. Evan, Thomas Radcliffe and Co., Cardiff, under the superintendence of Captain Hesketh, Mr. H. E. Paradise, Mr. Maxwell Hill and Mr. W. T. James.

San Eduardo.—On November 25th, the steamer *San Eduardo* was launched on the Tyne by Messrs. Swan, Hunter and Wigham Richardson, Ltd. She is a fine steel vessel built for the Eagle Oil Transport Co., Ltd., London, and specially constructed to carry oil in bulk, with ten oil holds and two pump rooms. Coils heated by steam are to be fitted in the oil tanks, so that the heaviest oil may be conveniently dealt with in the coldest weather. The steamer is 420 ft. in length by 54 ft. beam and will carry 9,000 tons deadweight. She is built to attain the highest class in Lloyd's register, and will be in every respect an up-to-date oil carrier. She will be propelled by a set of triple-expansion engines, placed aft, which with the boilers are being constructed by Messrs. Swan, Hunter & Wigham Richardson, Ltd., and are designed for a speed of 11 knots per hour. Messrs. Wailes, Dove & Co.'s patent "Bitumastic" enamel has been applied throughout the bunkers, boiler-room tank, and their patent "Bitumastic" covering to the tank tops.

Kalix.—On November 25th, Sir Raylton Dixon & Co., Ltd., launched from their Cleveland Dockyard, Middlesbrough, the steel screw steamer *Kalix*, which they are building to the order of Messrs. Rederiaktiebolaget Lulea-Ofoten, of Stockholm. The vessel is of the latest improved type of cantilever framed construction with top-side water-ballast tanks and is intended to receive Norwegian Veritas A.1.1. class. She is of the shelter-deck type, her principal dimensions being 325 ft. by 46 ft. 6 in. by 23 ft. 3 in. moulded, and has a deadweight carrying capacity of about 5,000 tons on a light draught of water. She has four hatchways, four holds and is absolutely free from all obstructions such as beams, pillars or web frames, and perfectly self-trimming owing to the sloping sides of the ship. She will be fitted with triple-expansion engines having cylinders 23½ in., 36 in. and 64 in. by 42 in. stroke, supplied with steam by two large single-ended boilers working at 180 lbs. pressure by the North-Eastern Marine Engineering Co., Ltd., Wallsend-on-Tyne.

Dogger Bank and Fentonian.—On November 26th, there was launched from the yard of Messrs. Cochrane & Sons, Ltd., Selby, a steel screw fish carrier, named *Dogger Bank*, the principal dimensions being 142 ft. by 22 ft. 3 in. by 11 ft. 9 in. moulded. The carrier has been built to the order of Messrs. The Great Northern Steamship Fishing Co., Ltd., Hull, and will be replete with all the latest improvements for the fishing trade. She will be fitted with powerful triple-expansion engines by Messrs. W. V. V. Lidgerwood & Co., Coatbridge. On the same day there was launched a steel screw trawler named *Fentonian*, the principal dimensions being 120 ft. by 21 ft. 6 in. by 12 ft. 3 in. moulded. The vessel has been built to the order of Messrs. The Great Central Co-operative Engineering and Ship Repairing Co., Ltd., Grimsby, and will be fitted with powerful triple-expansion engines by themselves.

Cairnross. On November 26th, Messrs. Wm. Doxford and Sons, Ltd., launched from their yard at Pallion, Sunderland, the s.s. *Cairnross*, built to the order of The Cairn Line of Steamships, Ltd., Newcastle. The dimensions of the vessel are :—Length, 383 ft. ; breadth, 51 ft., moulded depth, 27⅝ ft. Deadweight capacity, 7,800 tons. During construction the vessel has been superintended by Mr. C. Waldie Cairns. Classification is with the British Corporation. Messrs. Doxford are supplying the boilers and the turbine engines, which latter are of Parsons type, running 1,700 revs. per minute, connected to the propeller shaft by gearing, the revolutions of the propeller being 65 per minute. There are three boilers containing 6,840 square ft. of heating surface. Messrs. Wailes, Dove & Co.'s "Bitumastic" enamel has been applied throughout the bunkers, cellular double bottom, tank top, bilges, etc.

Digby.—On November 27th, Messrs. Irvine's Shipbuilding and Dry Docks Co., Ltd., West Hartlepool, launched from their Harbour Dockyard the handsomely modelled steel screw passenger and cargo steamer *Digby*, for Messrs. Furness, Withy & Co.'s North Atlantic passenger, fruit and general cargo trade. The dimensions of the vessel are 365 ft. by 50 ft. by 25 ft. 6 in. depth moulded, having complete main, upper and shelter decks with a long bridge and boat deck amidships and a topgallant forecastle. She is classed 100 A1 at Lloyd's and is equipped to the requirements of the Board of Trade for a passenger certificate. A cellular double bottom is fitted all fore and aft, and fore and after-peak tanks for water ballast. The vessel is divided into seven water-tight compartments by means of six transverse bulkheads, and all appliances for the rapid loading and discharging of cargo are of the most up-to-date description, eight powerful steam winches being fitted in conjunction with twelve derricks, provision also being made at each mast for dealing with 15 to 20-ton lifts. The vessel has been specially designed and built for the carriage of Canadian fruit and dairy produce, large quantities of apples being brought to this country by the Furness Line, and so that the fruit may be delivered in good condition an elaborate system of mechanical ventilation has been fitted to the holds and 'tween decks. Four large lifeboats and two Jolly boats are fitted, all placed on the boat deck amidships, there being ample boat accommodation for all persons on board. A complete installation of electric light is being fitted throughout the vessel, including signal and binnacle lamps and cargo clusters at each hatch, with oil lamps in addition for emergency purposes. A combined steam and hand-steering gear is fitted in a house aft, directly connected to the rudder head, with telemotor attachment to the bridge amidships. A quick-warping steam windlass is fitted on the forecastle, steam being supplied to all the deck machinery from either of the main boilers. Elaborate accommodation for fifty-eight first-class passengers is arranged for in the fore end of the bridge space, and a handsomely furnished smoke-room is provided on the after end of the bridge deck. The first-class state rooms are fitted up with all the latest appliances for the comfort and convenience of the passengers. Accommodation for thirty-two second-class passengers is provided at the after end of the vessel, and the bath and lavatory accommodation throughout is of the most up-to-date description, hot and cold water being laid on to all baths and lavatory basins. Accommodation for the captain, officers, engineers, doctor, purser, stewards, etc., is provided for amidships, the sailors and firemen being berthed in the forecastle. A special Marconi room is situated on the fore end of the boat deck, complete with silent chamber, etc., and a long distance wireless telegraphy installation is being installed by the Marconi Company. The triple-expansion engines by Messrs. Richardsons, Westgarth & Co., Ltd., Hartlepool, have been specially designed for the North Atlantic trade, the scantlings throughout being exceptionally heavy. The cylinders are 28 in., 46 in. and 77 in. diameter by 48 in. stroke, and steam is supplied by three very large forced draught boilers working at 180 lbs. pressure. In addition to the main and auxiliary condensers being of the "Contraflo" type, the complete

"Contraflo system" has been adopted, embodying the latest improvements. All the auxiliary exhausts are collected in a Thermal Equalizer and steam cleanser, which communicates with the Cascade feed heater and filter, any surplus steam being automatically discharged to the auxiliary condenser. The feed water is further heated on the discharge side of the feed pumps in a Morrison's surface heater. The harbour feed donkey is float controlled from the Cascade filter tank and other auxiliaries in the engine-room include a Morrison's evaporator, fresh water and sanitary pumps, etc. The propeller has been designed for a higher number of revolutions, and is of solid manganese bronze. In the stokehold steam ash hoists are provided, also diamond blowers for cleaning the boiler tubes. Owing to the lamented death of Lord Furness, late chairman of both companies, the vessel was put into the water as quietly as possible without any christening ceremony.

Muntenta.—On November 27th, Messrs. Robert Thompson and Sons, Ltd., launched from their Southwick yard a first-class finely modelled cargo steamer, built to the order of Messrs. Theodoridi & Co., of London. Her principal dimensions are :—Length, 299 ft. ; breadth, 46 ft. ; depth moulded, 24 ft. 10 in. She will take Lloyd's highest class, and is constructed on the deep frame principle with one deck, leaving the holds clear of all obstructions. Ample water ballast is provided in the cellular bottom and after peak tank, and provision is made for carrying oil fuel in three compartments of the double bottom. The erections consist of poop 29 ft., bridge 90 ft., both available for cargo, and forecastle for the accommodation of the petty officers and crew. Large and spacious deck houses are arranged on top of the bridge deck for captain, officers and engineers, the saloon being tastefully decorated in polished oak. There are four large hatchways, each worked by a powerful steam winch for the rapid loading and discharging of cargo, with multitubular donkey boiler of ample capacity for supplying steam to deck machinery, steam windlass and steam steering gear. The engines, by Messrs. The North-Eastern Marine Engineering Co., Ltd., Sunderland, have cylinders 22½ in., 37½ in. and 61 in., with a stroke of 42 in., steam being supplied by large boilers working at a pressure of 180 lbs. per square in. During construction the vessel and her machinery have been under the supervision of Messrs. Robert Eeles & Co., of Newcastle-on-Tyne.

Volturnus.—On November 27th, there was launched from the yard of Messrs. R. Williamson & Son, Workington, a steel screw steamer, 175 ft. long, and designed to carry about 750 tons deadweight on Lloyd's freeboard. The vessel is built to the highest class at Lloyd's, and will be propelled by triple-expansion engines, having cylinders 14 in., 24 in. and 40 in. diameter by 27 in. stroke, steam being supplied by a cylindrical steel boiler, 14 ft. 6 in. diameter by 10 ft. long, working at a pressure of 180 lbs.

Ferriby.—On November 28th, there was launched at Goole a steel screw trawler, 140 ft. long, which will be fitted out in the most complete way for fishing in the White Sea and adjacent waters. She will have triple-expansion engines. The vessel has been constructed to the order of Mr. J. H. Collinson, of Hull.

Albano.—On November 28th, a handsomely modelled steamer, the *Albano*, built to the order of Messrs. Thomas Wilson, Sons & Co., Ltd., for their general Stockholm trade, was launched from the yard of Earle's Shipbuilding and Engineering Co., Ltd., Hull. The principal dimensions are : Length, 250 ft. ; breadth, 37 ft. moulded ; depth, 16 ft. 6 in. moulded. She has been constructed of steel throughout to the British Corporation Registry's highest class, and to the latest requirements of the Board of Trade. The vessel is of the shelter-deck type with cruiser stern and designed for carrying a large quantity of water ballast. The accommodation consists of chart-room and captain's room in a house on the bridge deck, the officers, engineers and steward being berthed in houses round the engine and boiler casing, and the petty officers and crew aft. She has two steel masts and efficient appliances for the rapid handling of cargo, the derricks being worked by powerful steam winches of up-to-date description. A steam windlass, also steam and hand steering gear will be fitted. A capacious refrigerated chamber is arranged at fore end of the after hold for carrying beef, butter, etc. The vessel will be fitted up with a complete electric light installation. The saloon, officers' and engineers' ooms will be heated by steam. The machinery consists of a set of triple-expansion engines having cylinders 19 in., 31 in. and 53 in. diameter by 36 in. stroke, steam being supplied by two single-ended cylindrical boilers working at a pressure of 180 lbs. per square in.

Harflete.—On December 7th, an important addition was made to the fleet of Messrs. J. & C. Harrison, Ltd., of London, when the fine steel screw steamer *Harflete* was launched from the yard of The Northumberland Shipbuilding Co., Ltd., Howdon-on-Tyne, the vessel being 425 ft. in length and 52 ft. beam, with three complete steel decks including the shelter deck all fore and aft, with a cargo carrying capacity of over 8,800 tons. The vessel is constructed in the most up-to-date manner, *viz.*, on the deep bulb angle frame principle, has clear holds and is fitted with the latest improvements and appliances to make her in every way a first-class liner. A large quantity of water ballast is carried in the cellular double bottom deep tank and after peak. The shelter 'tween decks is of exceptional height and is so arranged that a large number of emigrants, troops or horses can be carried. The loading and discharging facilities are complete, the steamer having eleven derricks and eleven winches to ensure the most expeditious handling of cargo. An electric light installation will be fitted throughout the vessel. She has been constructed to a fine model with a view to rapid speed and economy in fuel, and the machinery will be supplied by Earle's Shipbuilding and Engineering Co., Ltd., of Hull, consisting of engines with cylinders 28 in., 46½ in., 78 in. by 54 in., three boilers 15 ft. 3 in. by 12 ft., 200 lbs. pressure, constructed to the requirements of the Hamburg Baupolizei, and fitted with Howden's forced draught. During construction the vessel has been superintended by Mr. W. Crandell and Mr. J. White. Messrs. Wailes, Dove & Co.'s patent "Bitumastic" enamel has been applied throughout the engine-room tank, bunkers, etc., and their patent "Bitumastic" covering to the tank tops.

Clan Mactavish.—On December 9th, there was launched on the Tyne a large steel screw steamer, built to the order of Messrs. Cayzer, Irvine & Co., Ltd., Glasgow, for the Clan Line. The principal dimensions of the vessel are :—Length, 465 ft. ; breadth, 57 ft. ; and depth moulded, 37 ft. 1 in. ; with a deadweight carrying capacity of 8,850 tons. The cellular double bottom and the forward and aft peaks are fitted for water ballast, and No. 3 lower hold amidships can be arranged as a deep ballast tank when required. Nos. 1 and 4 lower holds and 'tween decks are insulated and arranged for carrying frozen meat, fruit or produce. The vessel is provided with five large hatches, and a very complete installation of cargo derricks, one of which is capable of lifting 40 tons. The vessel is fitted throughout with electric light, and a powerful searchlight is fitted forward. The propelling machinery, of the triple-expansion type, has been manufactured by the Wallsend Slipway and Engineering Co., Ltd., having cylinders 31½ in., 52 in., 86 in. by 60 in. stroke, steam being supplied by four boilers 16 ft. 4 in. diameter by 11 ft. 9 in. long, working at a pressure of 220 lbs. She has been built to British Corporation rules. Messrs. Wailes, Dove and Co.'s "Bitumastic" enamel has been applied throughout the bunkers and their patent "Bitumastic" covering to the flat of decks in the air-cooler rooms.

Tabarka.—On December 9th, Messrs. William Gray & Co., Ltd., launched the handsome steel screw steamer *Tabarka*, which they have built to the order of Messrs. Frank C. Strick and Co., Ltd., of London and Swansea, for La Tunisienne Steam Navigation Co., Ltd., of Paris. She will take the highest class in Lloyd's register and is of the following dimensions : Length, overall, 362 ft. ; breadth, 50 ft., and depth, 27 ft. 8 in., with long bridge, poop and topgallant forecastle. The saloon, state-rooms, captain's and officers' rooms will be fitted up in the poop, the engineers in houses on the bridge deck and the crew's berths in the forecastle. An electric light installation is being fitted throughout. The hull is built with deep bulb-angle frames, cellular double bottom and large aft peak ballast tank, ten steam winches, steam steering gear amidships, hand screw gear aft, patent direct steam windlass, large horizontal multitubular donkey boiler, stockless anchors, telescopic masts with fore and aft rig, boats on deck overhead, and all requirements for a first-class cargo steamer, including Porter's patent derrick sockets for dealing with heavy lifts by combining the ship's ordinary derricks. Triple-expansion engines are being supplied by the Central Marine Engine Works of the builders, having cylinders 24 in., 38 in. and 64 in. diameter with a piston stroke of 42 in., and

two large steel boilers adapted for a working pressure of 180 lbs. per square inch, working under Howden's system of forced draught. The ship and machinery have been constructed under the superintendence of Mr. Archibald Walker on behalf of the owners.

Diamond.—On December 10th, there was launched from the yard of Messrs. Cochrane & Sons, Ltd., shipbuilders, Selby, a steel screw trawler, the principal dimensions being 133 ft. 4 in. by 23 ft. by 13 ft. moulded. The vessel has been built to the order of Messrs. The Kingston Steam Trawling Co., Ltd., Hull, and will be replete with all the latest improvements for the fishing trade. She will be fitted with powerful triple-expansion engines by Messrs. C. D. Holmes and Co., Ltd., Hull.

Bowes Castle.—There has been launched at Sunderland a fine steel screw steamer of the following dimensions :—Length overall, 402 ft. ; breadth moulded, 51 ft. 3 in. ; depth moulded, 29 ft. 11 in. ; and having a gross tonnage of 4,650 tons. The vessel, which has been built to the order of the Lancashire Shipping Co., Ltd., of which Messrs. James Chambers & Co., of Liverpool, are managers, is of the two-deck type, with poop, bridge, and topgallant forecastle, and is built on the Isherwood system, and to Lloyd's highest class. The machinery consists of a set of triple-expansion engines with cylinders 25½ in., 42 in. and 70 in. diameter, with a stroke of 48 in.

Sharistan.—On December 23rd, Messrs. Richardson, Duck and Co., Ltd., launched from their yard a steel screw steamer of the following dimensions, *viz.* :—Length overall, about 418 ft. 6 in. ; breadth extreme, 52 ft. 6 in. ; depth moulded to upper deck, 30 ft., with a deadweight carrying capacity of about 8,100 tons. This vessel has been built for the Anglo-Algerian Steamship Co. (1896), Ltd. (Messrs. Frank C. Strick & Co., Ltd., London, managers), under the superintendence of Mr. Archibald Walker. She will class 100 A1 in Lloyd's Register and has been built under special survey. She has two complete decks, the upper being of iron where exposed, steel elsewhere, and the second deck being of steel. The vessel has a cargo poop, bridge amidships and topgallant forecastle. Accommodation for passengers, captain, officers and engineers is fitted up in steel deckhouses on bridge deck, quarters being provided under bridge for apprentices, hospital and ice house, also a large steel store in which a specie room is to be fitted. The topgallant forecastle will accommodate an extra large number of seamen and firemen, petty officers, native galley, lamp-room, etc. A cellular double bottom throughout and peak tanks are fitted for water ballast. The hatchways are extra large to expedite loading and discharging, and equipment includes eleven steam winches, derrick tables and crosstrees on masts, three derrick posts, eleven derricks, porter's patent derrick socket, steam quick warping windlass, steam-steering gear, stockless anchors, winch condenser of the Contraflo type with independent circulating donkey, fresh water condenser, electric bells, four lifeboats, etc., etc. The vessel will also have electric light installation by Messrs. Clarke, Chapman and Co., Ltd. The engines, by Messrs. Blair & Co., Ltd., have cylinders 27 in., 44 in., 73 in. by 51 in. stroke, steam being supplied by three single-ended boilers having a working pressure of 180 lbs. Howden's forced draught is fitted and engine specification includes bronze propeller, ash discharge tube, recess in tunnel for spare tail end, Weir's feed pump, Contraflo condenser, etc.

Salmonpool.—On December 23rd, Messrs. Ropner & Sons, Ltd., Stockton-on-Tees, launched from their shipbuilding yard a steel-screw steamer of the following dimensions, *viz.* : Length, 403 ft. ; breadth, 55 ft. 6 in. ; depth, 28 ft. 9 in. The vessel will be classed 100 A1 at Lloyd's, having main deck, poop, long bridge and topgallant forecastle. Accommodation for captain, officers and engineers is in houses on bridge deck, crew in the forecastle. The vessel has double bottom for water ballast on the cellular principle and in fore and after peaks. She will be fully equipped with an up-to-date outfit, including quick-warping windlass, stockless anchors, steam-steering gear amidships and powerful screw gear aft. The appliances for loading and discharging cargoes expeditiously are very complete, and include ten steam winches, double derricks to each hatch, steam being supplied by a large donkey boiler, working at 100 lbs. pressure per square inch. The engines will be of the triple-expansion type by Messrs. Blair & Co., Ltd., Stockton-on-Tees, of about 2,650 i.h.p., having three steel boilers 15 ft. 9 in. by 11 ft., 180 lbs. pressure of steam.

Batjan.—On December 23rd, Messrs. William Gray and Co., Ltd., launched the handsome steel-screw steamer *Batjan*, which they have built for the Netherland Steamship Co., Amsterdam. The vessel will take the highest class in Lloyd's Register and is of the following dimensions, *viz.* :—Length overall, 412 ft. 6 in. ; breadth, 53 ft. 6 in., and depth, 29 ft. 7½ in. She is a handsomely modelled vessel of the awning deck type, having three decks laid. The saloon, captain's, officers' and engineers' rooms and the crew's accommodation are all fitted up in houses on the awning deck. In addition to cellular double bottom and after peak tank for water ballast there is a deep tank or hold compartment fitted abaft the engine-room, giving a total capacity for water ballast of about 2,100 tons. The whole of the outfit, including twenty-two derricks and one 30-ton derrick, steam windlass, steam-steering engine controlled by telemotor gear, twelve steam winches with exhaust steam returned to winch condenser of the "CMEW" type, are of the most improved description. Electric lighting is fitted in all accommodation and working parts as well as fixed lights in all cargo compartments. The engines are of the triple-expansion type, supplied by the Central Marine Engine Works of the builders, having cylinders 28 in., 46 in. and 77 in. diameter with a piston stroke of 48 in., and four large steel boilers adapted for 180 lbs. working pressure per square inch and fitted with Howden's system of forced draught. A special feature of the boiler installation is the superheater, designed and made by the engine builders with a view of utilizing to the utmost the heat from the gases on their way to the funnel. Another feature of interest is the "CMEW" type of main condenser, which is designed to give a high vacuum in tropical waters. A special system of "CMEW" auxiliaries, including a winch condenser, will be installed in the engine-room.

Rounton Grange.—On December 23rd, The Northumberland Shipbuilding Co., Ltd., Howdon-on-Tyne, launched the finely-moulded steamer *Rounton Grange*, which has been built to the order of Messrs. Furness, Withy & Co., Ltd., West Hartlepool, for the Houlder Line, Ltd., London. The vessel is 397 ft. long by 52 ft. beam by 29 ft. 6 in. deep, of the single-deck type and has been built under special survey to the highest class at British Corporation. She is fitted with long bridge, poop and topgallant forecastle. Accommodation is in steel houses on bridge deck. There are ten steam winches by Messrs. Clarke, Chapman & Co., Ltd., a large number of cargo derricks and steam windlass by Messrs. Emerson, Walker & Thompson Bros. The usual water ballast arrangements for light passages are fitted. The machinery will be supplied by Messrs. Richardsons, Westgarth & Co., Ltd., of Sunderland, consisting of engines with cylinders 25 in., 40 in., 68 in. by 48 in. stroke, three large boilers with 180 lbs. pressure. The vessel will carry about 8,000 tons on a light draught and steam about 10 knots loaded at sea.

Elele.—On December 23rd, Messrs. Irvine's Shipbuilding and Dry Docks Co., Ltd., launched the handsome steel-screw steamer *Elele*, built for Messrs. Elder, Dempster & Co., of London and Liverpool, the vessel being intended for trading on the West African Coast. The dimensions of the vessel are :—Length, 420 ft. ; beam, 54 ft. ; depth, 26 ft. 3 in., with complete main, upper and shelter decks, and poop, bridge and forecastle above the shelter deck. She is classed Lloyd's 100 A1, and is built with channel frames and channel beams which, with a combination of wide spaced hold pillars and girders, gives clear holds and a maximum of capacity. Cellular double bottom is fitted all fore and aft, having a centre water-tight division with fore and after peaks for water ballast. The loading and discharging appliances are of the most up-to-date description, consisting of fifteen powerful steam winches, sixteen Mannesmann tube derricks and one special derrick capable of dealing with lifts of 50 tons. The vessel is also fitted with a combined steam and hand steering gear direct on the rudder head, with telemotor attachment amidships, patent direct steam windlass, stockless anchors, two lifeboats and six surf boats of special design for handling cargo on the coast, and a complete installation

of electric light is fitted, including signal lamps, binnacles and cargo clusters at each hatch. Elaborate accommodation for a number of first and second-class passengers is fitted amidships in specially designed state-rooms, together with large dining saloon, smoke room, baths, lavatories, etc. One of the special features is the electric heating throughout, which, together with electric fans, which are fitted to each berth, and mushroom and torpedo ventilators, should greatly add to the comfort of the passengers, even in the tropical climate in which the vessel is intended to trade. The captain, officers, engineers, etc., are also berthed amidships in spacious rooms, the seamen being berthed in the forecastle and the firemen, greasers, etc., in the poop. A complete installation of refrigerating machinery is fitted on board, with large insulated rooms for passengers, provisions, etc. The machinery, which has been constructed by Messrs. Richardsons, Westgarth & Co., Ltd., Hartlepool, consists of a set of triple-expansion engines, with cylinders 26 in., 44 in. and 74 in. diameter by 51 in. stroke, and three large boilers working under forced draught at a pressure of 205 lbs. per square inch. The design has been very carefully considered with a view to obtaining the best possible results in ordinary work at sea, and the specification embodies the latest improvements in marine engine practice. Both the main and auxiliary condensers are of the Contraflo type and the Contraflo system has been adopted in its entirety. The whole of the auxiliaries exhaust into an oil-separating surface-feed heater, the water of condensation being led into the cascade filter tank and any surplus steam is automatically discharged to the cascade or to the auxiliary condenser as required. The main and also the auxiliary condensers are provided with separate centrifugal circulating pumps. The main feed pumps are of the slow speed independent type and the general service pump is float-controlled from the cascade filter tank. Other auxiliaries include Geddes Pulsators, Morison's evaporator with automatic feed water regulator, large vertical duplex ballast pump, sanitary and wash deck pumps, etc. The propeller is of the built type, the boss being of cast steel and the blades of manganese bronze. The machinery has been built to the specification of Mr. J. B. Wilkies, Liverpool, assisted by Mr. G. H. M. Hutchinson.

LAUNCHES—Scotch.

Empress of Asia.—On November 23rd, the quadruple-screw steamer *Empress of Asia* was launched by the Fairfield Shipbuilding and Engineering Co., Govan. She is the eighth vessel built at Fairfield for the Canadian Pacific Railway, and with her sister ship the *Empress of Russia*, will be by far the largest plying between the American continent, Japan and China. They are each 590 ft. in length, 68 ft. in breadth and 46 ft. in depth, and of about 15,000 tons gross, and their speed will be 18 knots. The main saloon in each will be 74 ft. long and 64 ft. wide. It will be lit from the sides by a number of beautifully designed windows nearly 5 ft. in width, and from above by a large well 26 ft. long and 16 ft. wide. The first-class state-rooms on the bridge deck will be enclosed in a steel deckhouse 340 ft. in length. Each of the rooms will be 10 ft. by 9 ft., with sleeping berths for two persons. A feature is that two state-rooms can be converted into one suite, with dressing-room adjoining. Surrounding the deckhouse there will be a promenade 430 ft. long on either side, with a minimum width of 8 ft. At the aft end, for 100 ft. in length, it extends from side to side of the ship. The hulls are each to be sub-divided by numerous water-tight bulkheads, closely spaced, one effect of which will be that any four compartments can be open to the sea or flooded, and the vessel will remain afloat. This is considerably in excess of Board of Trade requirements. A departure from current practice has been made in constructing the vessels with cruiser sterns and rudders entirely underhung. This form of stern, besides giving the ships a very distinctive appearance, increases the effective length of the waterline, and so assists propulsion and adds considerably to the available deck areas at the after end. Each vessel will carry 200 first-class, 100 second class and 800 third-class passengers, and will also have large freight-carrying capacity. Special arrangements have been made for carrying silk, as it is by the Canadian Pacific route that the bulk of this commodity is conveyed from Japan to the markets of the world. By following a specified northern course the C.P.R. mail steamers shorten the route by about 30 miles as compared with the routes to the United States ports.

Good Hope.—On November 23rd, there was launched at Leith a composite screw tug named *Good Hope*. The dimensions of the vessel are:—Length overall, 70 ft. 6 in., and breadth 16 ft. 8 in. She is to be used as a tug and salvage steamer and is fitted with a powerful salvage pump, electric light, steam windlass and all the latest appliances. The builders have to deliver the boat at Mossel Bay, South Africa.

Wahine.—On November 25th, there was launched at Dumbarton the steamer *Wahine*, a handsome passenger vessel, which has been built to the order of the Union Steamship Co., of New Zealand, and designed for their service between Wellington and Lyttelton. Her principal dimensions are:—Length, 374 ft.; breadth, 52 ft.; and depth, 27 ft. 6 in. The propelling machinery consists of three sets of turbines. Messrs. Wailes, Dove & Co.'s "Bitumastic" enamel was applied throughout the bunkers, tanks and bilges, and their patent "Bitumastic" covering to the tank tops.

Masarua.—On November 27th, there was launched from the shipbuilding yard of Messrs. David & William Henderson and Co., Ltd., Partick, a large steel screw cargo steamer which they have constructed to the order of Messrs. Maclay and McIntyre, of Glasgow. This latest addition to the fleet of vessels owned by this firm is in length 416 ft. overall, breadth moulded 52 ft., with a depth of 29 ft. 10 in. moulded, having a gross tonnage of about 4,950 tons, and will be classed in Lloyd's 100 A1 three-deck rule. She has been fitted with all the latest improvements to ensure the rapid and safe working of the large cargo which she has been designed to carry, including nine powerful winches and also large derricks fitted at the hatches. A complete installation of electric light has been fitted throughout the vessel. Steam steering gear is fitted amidships; the saloon and officers' accommodation is on the fore end of bridge deck and a chart-room and wheelhouse have been built above this with a bridge which will give every facility to the officers in the navigation of the vessel. A set of triple-expansion engines will be supplied and fitted by the builders having cylinders 25 in., 41 in. and 67 in. diameter by 51 in. stroke, also three large single-ended boilers, working at a pressure of 175 lbs.

Borderland.—On November 28th, there was launched at Whiteinch the single-screw steamer *Borderland*, which has been built to the order of the Liverpool and Hamburg Steamship Co. (Messrs. Donald Currie & Co., managers). The vessel, which is about 1,825 tons gross, is an up-to-date cargo-carrying steamer, constructed to Lloyd's class. She is to be fitted with engines developing power sufficient to give a speed on service of 12 knots. The ship is designed to carry about 3,000 tons deadweight on a draught of 21 ft.

Niceto de Larrinaga.—There was launched recently at Port Glasgow a steamer named *Niceto de Larrinaga*, which has been built to the order of Messrs. Larrinaga & Co., Liverpool. The vessel is of the following dimensions:—Length, 420 ft.; breadth, 54 ft.; depth, 28 ft. 5 in., with a gross tonnage of 5,300. She is of the shelter-deck type, and has been built to the highest class at Lloyd's.

Baron Wemyss.—Messrs. Dunlop, Bremner & Co., Port Glasgow, launched during November the steamer *Baron Wemyss*, of 3,200 tons deadweight, which they have built for Messrs. Hugh Hogarth & Sons, Glasgow. The dimensions of the vessel are:—Length, 275 ft.; breadth, 40 ft.; depth to upper deck, 19 ft., and to shelter deck, 27 ft. Engines will be supplied by Messrs. David Rowan & Co., Glasgow.

Penang Maru.—Messrs. Russell & Co., Port Glasgow, launched during November the steamer *Penang Maru*, which they have built for the Nippon Yusen Kaisha, Tokyo. The dimensions of the vessel are:—Length, 405 ft.; breadth, 52 ft. 3 in.; depth moulded, 30 ft.; and measurement, 4,900 tons gross. She has been built to the highest class at Lloyd's, and is intended for the general carrying trade in the East. During construction the vessel was superintended by Messrs. A. R. Brown, Macfarlane & Co., Glasgow, agents for the owners. Messrs. Rankin & Blackmore, Greenock, will supply the engines. The *Penang Maru* is the first vessel launched by Messrs. Russell & Co. from the establishment which they acquired from Messrs. A. Rodger & Co. about eight months ago.

Hopper-Dredger.—Messrs. Ferguson Brothers, Port Glasgow, launched recently a 1,200-ton twin-screw hopper suction

dredger which they have built to the order of the Commissioners for the Port of Calcutta. The machinery, which was supplied by the builders, consists of two sets of triple-expansion engines of 1,450 i.h.p. The suction pumps are of cast steel throughout, and have been specially constructed for the vessel. Steam is supplied by two large Scotch boilers having a working pressure of 160 lbs. The vessel has been constructed under the superintendence of Mr. J. Augus, consulting engineer for the owners, and Mr. W. Adam, Paisley, resident inspector.

Itagiba.—On December 5th, there was launched at Troon the twin-screw passenger and cargo steamer *Itagiba*, which has been built to the order of Messrs. John M. Campbell and Sons, Glasgow, for foreign owners. The vessel, which is of 2,200 tons, is the last of an order for five similar steamers for the same owners, and the whole five have been launched at Troon during the present year. Messrs. Wailes, Dove and Co.'s "Bitumastic" enamel was applied throughout the bunkers, peak tanks, etc., and their patent "Bitumastic" cement to the flat of bottom.

Ben Ardna.—On December 9th, there was launched at Aberdeen a steam trawler which has been built to the order of Messrs. Richard Irvin & Sons, of that port. The vessel, which is of about 220 tons, will have triple-expansion engines. The vessel has been named *Ben Ardna*.

Wandana.—On December 9th, there was launched at Govan the steamer *Wandana*, which has been built for the West Coast Shipping Co. of Port Adelaide, South Australia, for their passenger and general cargo trade on the Australian coast. The vessel has been built to Lloyd's highest class, is of the raised quarter-deck type, and is of the following dimensions :—Length overall, 215 ft. ; breadth, 32 ft. 6 in., and depth, 16 ft. 3 in. to quarter deck ; and a gross measurement of about 950 tons. Accommodation is provided for about 100 first-class and for a number of steerage passengers. Triple-expansion engines designed to give a speed of 11 knots in service will be supplied.

Baron Yarborough.—On December 21st, there was launched by Messrs. Napier & Miller, Ltd., Old Kilpatrick, the steel screw steamer *Baron Yarborough*, which they have built to the order of Messrs. H. Hogarth & Sons, Glasgow. The vessel has been built to the highest class under the British Corporation rules. The principal dimensions are :—Length, between perpendiculars, 285 feet ; breadth moulded, 42 ft. 6 in. ; depth moulded, 27 feet, with a carrying capacity of about 3,500 tons. She has complete shelter and upper decks, water ballast in cellular double-bottom and aft peak. The vessel has a most complete and convenient arrangement of hatches, derricks and five steam winches for the rapid handling of cargo. Electric light is fitted throughout. The machinery, which is being supplied by Messrs. Dunsmuir and Jackson, Ltd., Govan, consists of triple-expansion engines, with cylinders 18½ in., 31 in. and 52 in. respectively, by 36 in. stroke. There are two boilers, also a donkey boiler. The hull and machinery have been constructed under the direction of Mr. Hutcheson, superintendent of Messrs. H. Hogarth & Sons, assisted by Mr. Robertson. The naming ceremony was gracefully performed by Miss Gracie Henderson, of Glenduran, Crookston.

LAUNCHES—Irish.

Nestor.—On December 7th, at high water, there was launched from the North Yard of Messrs. Workman, Clark and Co. the twin-screw steamer *Nestor*, built to the order of Messrs. Alfred Holt & Co., Liverpool, for their Blue Funnel Line. The vessel is the first of a new and improved type for the owners' passenger service between Great Britain and Australia at present being carried out by the *Aeneas*, *Ascanius* and *Anchises*, recently constructed for Messrs. Holt by the same builders. The *Nestor* is 580 ft. in length, with a gross tonnage of about 14,500, and complies with the Board of Trade requirements for a first-class passenger certificate. The special feature of these vessels is the passenger accommodation, occupying the midship portion of three decks, which is arranged for first-class passengers only. The arrangement and equipment of the vessel have received most careful consideration, and the result of this is seen in the abundance of space in the state-rooms, the handsome appearance of the large public saloons with their luxurious fittings, the adoption of efficient systems of heating and ventilation and the generous provision made for social and physical recreation. Accommodation is provided for 350 passengers. The dining saloon is situated on the main deck and extends the full breadth of the vessel, and is exceptionally lofty. Adjoining the dining saloon is a cheerful and attractive room set apart for the use of the children. A broad oak staircase, with handsome carved balustrades and fluted columns, leads from the dining saloon to the entrance hall on the promenade deck. The main entrance hall on the centre castle deck, with the stairways and landings at the several decks, has been arranged to ensure the greatest possible amount of space and light, with a view to minimizing as far as possible the crowding at times of embarkation and departure. On each side of this hall there is a vestibule with double doors giving access to the centre castle deck, which with the promenade deck above affords ample space for promenading and games, and as each of these decks is well protected by decks above passengers will be able to indulge in recreation under all conditions of weather. The music-room, opening off the forward end of the main entrance hall, is the drawing-room of the vessel, and in design it is lofty and graceful. A very special feature is the large and luxurious saloon lounge on the promenade deck. This apartment is tastefully furnished and decorated, and has a large open fireplace at one end. The smoke-room, also on the promenade deck, is another splendid public room, and has a high wagon roof with dormer lights. The room is well lighted by large rectangular windows in the sides. Among other features may be mentioned the wireless telegraph-room fully equipped with the most modern appliances, a barber's shop and the steam laundry fitted up with centrifugal wringers, mangles and presses. In connection with the pantry there is a large suite of refrigerating chambers for fresh provisions. From the freight point of view the vessels are exceptionally well furnished. There are seven spacious holds, which by the adoption of the girder system of construction are free of obstruction and are thus capable of receiving the largest type of consignment. One of these holds, together with the after 'tween decks, has been completely insulated and fitted up for the reception of frozen meat, dairy produce and fruit. For the preservation of this cargo and the stewards' stores an extensive plant of refrigerating machinery has been installed. A large baggage and parcel-room, arranged so as to be accessible at all times, is provided for the storage of passengers' luggage. The vessel will be propelled by two independent sets of triple-expansion engines, carefully designed and adjusted to reduce vibration to a minimum, with a complete installation of auxiliary plant, including steam pumps for various duties, electric light dynamos and refrigerating machinery. Steam is supplied by three large double-ended and two single-ended cylindrical multitubular boilers working under forced draught.

Ceramic.—On the 11th December, the *Ceramic* was successfully launched at Belfast by Messrs. Harland & Wolff, Ltd. The vessel has been built for the White Star Line for their Australian trade, and is a triple-screw passenger steamer, having the arrangement of machinery, *i.e.*, twin-screw reciprocating engines combined with low-pressure turbine, already so successfully adopted in White Star vessels. The new vessel is 675 ft. long by 69 ft. 3 in. beam and will have a gross tonnage of about 18,000 tons ; and besides enormous capacity for cargo, as already indicated, will have accommodation for 600 passengers ordinarily, with arrangements for possible extension for a further 220, or a total complement of 820 if required. It is anticipated, in view of the remarkable development in Australian immigration from the mother country and the popularity of White Star vessels, that even this extensive accommodation will be taxed to its utmost capacity. The *Ceramic* is of very strong construction, built under survey of the Board of Trade for passenger certificate, and having twelve water-tight bulkheads dividing the vessel into thirteen water-tight compartments. Eleven of the bulkheads are carried to the upper deck and the aftermost bulkhead to the middle deck. The double bottom extends right fore and aft, and is built on the cellular principle, specially strengthened in way of the engines by additional intercostals, etc. There are eight steel decks and, needless to say, all the facilities for working ship and cargo embody the latest improvements. The vessel will, of course, be lighted throughout by electricity, and will have a complete installation of wireless telegraphy and sufficient lifeboats to accommodate every soul on board, the boats being manipulated by patent davits. The passenger accommodation

will leave nothing to be desired. Full advantage has been taken of the vessel's size in designing the public rooms, and the state rooms, as usual in White Star ships, are large, comfortable and well ventilated. The dining saloon, on the middle deck, will seat about 540 persons. It will be finished enamel white, and with large side lights arranged in pairs will be a most attractive room. The reading and writing-room, on the bridge deck, in oak, with suitable furniture and Messrs. Harland & Wolff's large brass framed opening windows arranged in pairs, will be another fine apartment, as also the general room on the same deck, just forward of the reading and writing room, and the smoke-room amidships. These two latter rooms are also panelled and framed in oak, with large sidelights in pairs and suitable furniture. The main entrance and staircase are spacious and attractive. A feature in this vessel will be the well-equipped gymnasium on the bridge deck just forward of the smoke-room. The state-rooms are arranged mostly as two and four-berth rooms. Messrs. Wailes, Dove & Co.'s "Bitumastic" enamel has been applied throughout the boiler space and their patent "Bitumastic" covering to the tank top.

FOREIGN LAUNCH.

Emanuel Nobel.—There has been launched at Amsterdam the steel twin-screw motor tank steamer *Emanuel Nobel*, which has been built for account of the Soc. An. d'Armement, d'Industrie et de Commerce of Antwerp. The vessel is 300½ ft. long, by 51 ft. beam, by 29 ft. depth, and has a carrying capacity on 22½ ft. of 6,250 tons, and a speed of 11 knots. The vessel has sixteen tanks, eight summer tanks, four cofferdams, and a pump room. The ship, which will be propelled by two Werkepoor-Diesel motors, each of 1,100 i.h.p., has been built to the requirements of Bureau Veritas, under survey of Mr. J. C. F. Muller, inspector to the owners.

TRIAL TRIPS.

Arakan.—On November 16th, the handsome steel screw steamer *Arakan*, built by Messrs. Wm. Gray & Co., Ltd., for Messrs. the Rotterdamsche Lloyd Steamship Co., Rotterdam, had her trial trip. An exhaustible trial was made, during which the performance of both vessel and machinery gave entire satisfaction to all concerned. For Launch, see November issue.

Herakles.—On November 19th, the s.s. *Herakles*, built and engined by Messrs. Wm. Doxford & Sons, Ltd., Pallion, Sunderland, to the order of Messrs. Bruusgaard, Kiosterud and Co., Drammen, ran a successful sea trial, when a mean speed of 11¼ knots was attained. For Launch, see December issue.

Sanwarine.—On November 21st, the s.s. *Sanwarine*, built by the Clyde Shipbuilding and Engineering Co., Ltd., Port Glasgow, to the order of Messrs. R. F. Sanderson & Co., of Manchester, underwent her load trials and attained a mean speed of 11·1 knots. For Launch, see November issue.

Mokta.—On November 28th, the handsome steel screw steamer *Mokta* was taken from the yard of Messrs. Wm. Gray & Co., Ltd., for her trial trip. The performance of the vessel and the working of the machinery were highly satisfactory. For Launch, see November issue.

La Correntina.—On November 29th, the twin-screw insulated steamer *La Correntina* proceeded on her official trial trip. The *La Correntina* is the second of two duplicate vessels built by Messrs. Irvine's Shipbuilding and Dry Docks Co., Ltd., West Hartlepool, for Messrs. The Houlder Line, Ltd., and she will take her place in the new fortnightly express service of steamers between the River Plate and Liverpool. Owing to the inclement weather it was found impossible to run any speed trials, but the machinery and all auxiliaries worked very satisfactorily. For Launch, see July issue.

Gerald Turnbull.—On November 30th, the steamer *Gerald Turnbull*, built at Sunderland to the order of the Turnbull Bros. Shipping Co., Ltd., of Cardiff, was taken to sea on her official loaded trial. She is a single decker, classed 100 A1 at Lloyd's under special survey, and carries a large deadweight on a light draught. The main engines are supplied by the North-Eastern Marine Engineering Co., Ltd., Sunderland, and have cylinders 23½ in., 39 in. and 66 in. by 42 in. stroke, steam being supplied by two large boilers working at a pressure of 180 lbs. The trial was in every way satisfactory; everything worked well, and a mean speed of 10½ knots was obtained. On completion of the trial the ship proceeded on her voyage to Buenos Ayres.

Inglemoor.—On December 7th, the steel screw cargo steamer *Inglemoor*, recently launched by the Blyth Shipbuilding and Dry Docks Co., Ltd., was taken to sea for trial. The performance of both ship and machinery during the several trial runs gave every satisfaction to all concerned. For Launch, see December issue.

Vanellus.—On December 10th, the new steamer *Vanellus*, the latest addition to the fleet of the Cork Steamship Co., Ltd., Cork, sailed from the Tyne on the completion of a very successful trial trip. The steamer has been built and engined at the Neptune works of Messrs. Swan, Hunter & Wigham Richardson, Ltd. She is 285 ft. in length by 38 ft. beam, and carries over 2,700 tons deadweight on 19½ ft. draught. She has been constructed to attain the highest class in Lloyd's register, has accommodation for a few passengers, and is in every way a cargo steamer of the highest class. Her propelling machinery, consisting of a set of triple-expansion engines, supplied with steam by two boilers, has been constructed at the Neptune works of Messrs. Swan, Hunter and Wigham Richardson, Ltd. On the trial trip it worked without the slightest hitch, and gave satisfaction to all concerned, driving the vessel at a speed of over 12 knots per hour. After the trial trip, the vessel sailed to take up her station in the company's service between Liverpool, Manchester and Dutch and Belgian ports.

Kentucky.—On December 10th, the new steamer *Kentucky*, built by Messrs. Workman, Clark & Co., Ltd., Belfast, for the Bucknall Steamship Lines, Ltd., left Belfast Harbour and proceeded down the Lough to Carrick Roads for adjustment of compasses, machinery tests and speed trials. The results attained were highly satisfactory, and the vessel afterwards left for Cardiff to take in coal in preparation for her initial trip to New York. For Launch, see December issue.

Grena.—On December 12th, the s.s. *Grena*, built and engined by Messrs. Wm. Doxford & Sons, Ltd., Pallion, Sunderland, to the order of J. Ludwig Mowinckel, Esq., Bergen, ran a successful sea trial, when a mean speed of 11 knots was attained. For Launch, see December issue.

Harmatris.—An important addition has just been made to the fleet of Messrs. J. & C. Harrison, Ltd., of London, in the fine steel screw steamer *Harmatris*, which left the Tyne on Dec. 12th to undergo her official trial trip. The vessel is 425 ft. in length, and has a cargo carrying capacity of over 8,800 tons. She has been constructed to a fine model with a view to rapid speed and economy in fuel. The machinery consists of engines with cylinders 28 in., 46½ in. and 78 in. by 54 in. stroke. The trial proved very satisfactory and a speed of 15 knots was obtained. For launch see November issue.

Pen Cw.—On Dec. 13th, the new paddle tug and passenger tender *Pen Cw*, which has been constructed by Messrs. Jos. T. Eltringham & Co., of South Shields, to the order of the Great Western Railway Company, was taken out for her speed trials. The machinery gave every satisfaction, and a speed in excess of the contract speed was obtained. After the trial the vessel returned to the builders' yard preparatory to leaving for Fishguard, where she is to be employed. For launch see December issue.

Fotis.—On December 13th, the first class finely-modelled cargo steamer *Fotis*, built by Messrs. Robert Thompson and Sons, Ltd., at their Southwick Yard, to the order of N. D. Lykiardopulo, Esq., of Piræus, Greece, proceeded to sea for her loaded trial. The trial trip was very successful, the engines running with perfect smoothness, easily attaining a mean speed of about 10½ knots, and Mr. Lykiardopulo, who was on board, expressed entire satisfaction with both vessel and machinery. For Launch, see December issue.

Larchmore.—This high-class cargo vessel, completed by Messrs. Joseph L. Thompson & Sons, Ltd., of the North Sands Shipbuilding Yard, Sunderland, recently underwent her official trial trip and easily maintained an average speed of about 12 knots on the measured mile, and on the subsequent run round to Barry averaged about 11½ knots. The vessel has been specially constructed to the order of Messrs. Wm. Johnston & Co., Ltd., of Liverpool, and is the third vessel Messrs. Thompson have constructed for these owners. The principal dimensions of the vessel are :—Length, 388 ft.,

by breadth extreme 52 ft., by depth moulded 27 ft. 11 in. She has been constructed to the highest class on the British Corporation rules. The vessel has two decks and a poop, bridge and forecastle, and has been specially designed to have a large deadweight capacity on a light draught of water. Special attention has been paid to the accommodation of the officers and engineers, who are berthed in large houses on the bridge, the whole of which are provided with steam heaters. The crew and firemen are berthed in a large topgallant forecastle. The vessel is rigged as a two-masted fore and aft schooner, derrick tables and outriggers being fitted. There are eight large winches, with twelve derricks, and provision for using a 20-ton derrick, so that the vessel is well equipped for the rapid handling of heavy cargoes. The propelling machinery was constructed by Messrs. George Clark, Ltd., of Sunderland, the sizes of the cylinders being 25 in., 41 in., 68 in. by 48 in., supplied with steam from three large boilers working at 180 lbs. pressure. A complete installation of electric lighting was provided by the Sunderland Forge and Engineering Co., of Sunderland. The trial trip was a complete success in every way, everything working smoothly and giving complete satisfaction to everyone on board. The construction of the vessel and machinery was under the superintendence of Messrs. D. Beatson and C. Surtees, the owners' superintendents.

Cap Breton.—The screw steamer *Cap Breton*, built by Messrs. Smith's Dock Co., Ltd., to the order of Messrs. Plisson and Co., Paris, Bayonne and Cardiff, has had her official trial trip. The trial proved entirely satisfactory, the vessel attaining a speed of 11 knots. She afterwards proceeded to Dunston to load. For Launch, see November issue.

Bernicia.—The steamer *Bernicia*, built at Leith for Messrs. James Currie & Co.'s Leith and Newcastle trade, has recently undergone her trials. For Launch, see November issue.

Lucellum.—The large oil-tank steamer *Lucellum*, which has just been completed on the Wear by Sir James Laing and Sons, Ltd., has undergone trials at sea. The speed trial was considered very satisfactory, as also were the trials of the auxiliary machinery, including the working of the oil discharge and ballast pumps. The vessel proved extremely handy to manœuvre, and under all conditions of steaming there was a complete absence of vibration. For Launch, see December issue.

Trevaylor.—On December 18th, the new screw steamer *Trevaylor*, built by Messrs. John Readhead & Sons, Ltd., West Docks, South Shields, to the order of Messrs. Edward Hain & Son, St. Ives, was taken to sea on her official trial trip. The trial was in every way satisfactory to all concerned, and the vessel will load for Port Said, under the command of Captain Robbins. For Launch, see December issue.

Anglo-Egyptian.—On December 16th, the s.s. *Anglo-Egyptian*, lately launched from the shipyard of Messrs. Short Brothers, Ltd., of Pallion, Sunderland, left the Tyne for her speed trials. Speed trials with and against tide were run over the measured mile, and a mean speed of 12¼ knots was attained with a cargo of 10,500 tons on board. The trial was thoroughly successful. For Launch, see November issue.

City of Bristol.—The trial runs of this vessel, built by Messrs. Swan, Hunter & Wigham Richardson, Ltd., for the Ellerman Line, took place at sea off the mouth of the river Tyne on the 16th December, and were successful in every respect, a speed of nearly 13 knots per hour being attained. For Launch, see December issue.

Hawkes Bay.—On December 18th, this new vessel left Belfast Harbour and proceeded to Carrick Roads, where the adjustment of compasses, machinery tests and speed trials were carried out. The results attained were highly satisfactory, and the vessel afterwards left for London to take in cargo and stores preparatory to sailing early in the New Year for the initial voyage to New Zealand and Australia *via* Capetown. For Launch, see November issue.

Clan Macbride.—On Dec. 19th, the new steel screw steamer *Clan Macbride*, built by Messrs. Ropner & Sons, Ltd., of Stockton-on-Tees, made her official trial trip in the Tees Bay, when a speed of 12½ knots was attained. The steamer has been built to the highest class at Lloyd's, and is of the two-deck type, the second deck being nine feet below the upper deck. Her dimensions are :—Length 403 ft. 6 ins., breadth 50 ft. 6 ins., depth moulded 30 ft. 6 ins., with a deadweight carrying capacity of 7,925 tons on her summer freeboard. She has a full poop, in which are berthed the crew, bridge 115 ft. long and top gallant forecastle. Arrangements have been made to carry water ballast in the cellular double bottom, and in the fore and after peaks. The saloon and cabins for the captain, officers and engineers are fitted up in iron houses on the bridge deck. The vessel has a direct steam quick-warping windlass, stockless anchors, steam-steering gear amidships, with powerful screw gear aft, and is fitted with ten large steam winches, all working at 180 lbs. steam pressure, exhausting into a separate winch condenser in the engine room. Double derricks are fitted to work out each hatchway and all her appliances for loading and discharging cargoes are very complete, including a special derrick to lift 15-ton weights from either the fore main or after main holds. She is also fitted with an electric light installation throughout the ship. The engines and boilers have been supplied and fitted by Messrs. Blair & Co., Ltd., of Stockton-on-Tees, and are of the triple-expansion type, having cylinders 26 in. by 43 in. by 71 in. diameter by 48 in. stroke, steam being supplied by three single-ended boilers, each 15 ft. and 11 ft. 3 ins. long, with a working pressure of 180 lbs.

Saint Paul.—On December 19th, the s.s. *Saint Paul*, built by the Campbeltown Shipbuilding Co., Campbeltown, for Mr. L. Ballande Fils Ainé, of Bordeaux, ran trials at Wemyss Bay. Triple-expansion engines taking steam from two large boilers, under natural draught, have been supplied by Messrs. David Rowan & Co., Glasgow. The trials were very satisfactory.

Abosso.—On December 19th, this fine large twin-screw passenger and mail steamer, which has been built to the order of the African Steamship Co., London (Messrs. Elder, Dempster & Co., Ltd., Liverpool, managers), left Belfast. She is intended to sail from Liverpool on the 8th January for the West Coast of Africa. For Launch, see September issue.

Pastores.—On December 20th, the new steamer, *Pastores*, built and engined by Messrs. Workman, Clark & Co., Ltd., Belfast, left the harbour and proceeded to Carrick Roads for machinery trials. These proved highly satisfactory under all conditions, and the vessel afterwards returned to the builders' finishing wharf to complete the outfit and take in stores preparatory to leaving for Boston, U.S.A. For Launch, see October issue.

BOARD OF TRADE EXAMINATIONS.

NOVEMBER 21st, 1912.—LONDON.—*1st Class :* J. Balloch, P. Brown, G. Cope.

GLASGOW.—*1st Class :* D. Cameron, T. Hyslop, A. Strang. *2nd Class :* W. Gall, A. Paterson, J. Paul, J. Welch.

WEST HARTLEPOOL.—*1st Class :* A. Fowler, E. Harrison, T. Hart, J. Laverty, T. Marston, W. Mitchell, H. Pegg, S. Wheatley. *2nd Class :* W. Brown, J. Burke, T. Richardson.

LEITH.—*1st Class :* W. Orr. *2nd Class :* J. Dunbar, J. Mathieson, D. Robertson, M. Williams.

SOUTHAMPTON.—*1st Class :* G. Alford.

LIVERPOOL.—*1st Class :* J. Alcock, R. Clarke, S. Harvey, H. Johnstone, A. London, W. Nelson, W. Pendleton, A. Reed, T. Scobie. *2nd Class :* J. Button, R. Carpenter, T. Leech, J. Pattinson, H. Pears, A. Southern, J. Thomson, W. Wilson.

CARDIFF.—*1st Class :* A. Corfield, R. Crocker, A. Hoy. *2nd Class :* N. Bussell.

NORTH SHIELDS.—*1st Class :* A. Auton, J. Birch, J. Harney, J. Ollett. *2nd Class :* E. Ibbotson, F. Johnson, J. McKeag, W. Pollard.

NOVEMBER 28th, 1912.—LONDON.—*1st Class :* C. Hunter. *2nd Class :* P. Brown, W. Shannon, M. Taylor.

GREENOCK.—*1st Class :* R. Dick, A. McGillivray, W. Raeburn, A. Spence. *2nd Class :* P. Low, N. Meffan.

HULL.—*2nd Class :* R. McLaren.

NORTH SHIELDS.—*1st Class :* J. Cook, W. Roseburgh, R. Thompson, W. Wright. *2nd Class :* N. Alder, J. Chisholm, J. Duncan, J. Evans, J. Hilton, R. Hunt, T. Lamb, J. Morton, A. Thompson, F. Tyndall.

DOVER.—*2nd Class :* S. Belchamber.

LIVERPOOL.—*1st Class :* J. Macdonald, J. Parkes, H. Swift, G. Yates. *2nd Class :* J. Brewer, T. Cotter, G. Crozier, P. Douglas, S. Godfrey, J. Hall, T. Slater.

ABERDEEN.—*1st Class :* C. Auld, J. Dickey, J. Dorward, A. MacTaggan, W. Torrie. *2nd Class :* A. Anderson, C. Bruce, C. Mackenzie, A. Morrice, A. Sandilands, D. Stott.

SUNDERLAND.—*1st Class :* H. Jordan, F. Pinkney, P. Soarer, J. Spawls.

DECEMBER 5th, 1912. LONDON. *1st Class :* D. MacDonald. *2nd Class :* W. Latton, J. Perkins, G. Rodmell, I. Thomas, J. Thomas.

LEITH.—*1st Class :* T. Cleghorn, C. Mills. *2nd Class :* W. Maxwell, C. Scott, R. Scott, A. Smith.

CARDIFF.—*1st Class :* J. Goodall, J. Kennard, E. Talbot. *2nd Class :* R. Bennell, J. Jenkins, J. Thomas.

NORTH SHIELDS.—*1st Class :* H. Doncaster, N. Elliott, R. Shand. *2nd Class :* J. Carnegie, T. Craig, T. Gilmour, A. Knowles, G. Mawson, R. Smithson, C. Sowerby.

LIVERPOOL.—*1st Class :* A. Amey, D. Davies, A. Forbes, D. McQueen, W. Wignall. *2nd Class :* T. Bellis, T. Lawton, T. Parker, R. Robertson.

GLASGOW.—*1st Class :* H. Borland, C. Brown, J. Wallace. *2nd Class :* R. Aitken, J. Batchen, W. Brown, F. Livingstone, R. Nelson, W. Nicol, R. Potter, J. Stuart.

FALMOUTH.—*2nd Class :* J. Truscott.

BELFAST.—*1st Class :* W. McNielly, F. Rea. *2nd Class :* A. Crosbie, A. Marsters.

SOUTHAMPTON.—*1st Class :* R. Atkins, D. Hutchison.

DECEMBER 12th, 1912.—LONDON.—*1st Class :* H. Gaze, J. Owen, I. Salter, S. Williams, C. Willis. *2nd Class :* J. Baker, G. Batham, S. Browne, J. Collins, J. Miller, R. Newton, R. Wearn.

DUNDEE.—*2nd Class :* A. Malcolm.

GREENOCK.—*1st Class :* J. McPhie, A. Wilkie. *2nd Class :* J. Black, W. Cassie, J. Duff, C. Graham, D. MacDonald R. McGugan W. McKenzie, T. McKercher, C. Taylor, W. Wilson.

LIVERPOOL.—*1st Class :* J. Mackenzie, J. Menemey, W. Mybrea. *2nd Class :* W. Harding, A. Laing, J. Little, J. Rossiter.

HULL.—*1st Class :* G. Davids, W. Sykes. *2nd Class :* H. Collinson, R. Curtis.

NORTH SHIELDS.—*1st Class :* W. Earle, T. Mark, D. Stenhouse, T. Tose. *2nd Class :* W. Bailey, T. Baker, A. Brown, R. Clark, H. Lawrence, E. Porritt, G. Renwick, T. Stanley.

DECEMBER 19th, 1912.—LONDON.—*1st Class :* S. Attwood, S. Bradford, H. Carrington, W. May. *2nd Class :* G. Armstrong, H. Cheetham, N. Hodge, A. MacKillop.

GLASGOW.—*1st Class :* J. Hunter, D. McDonald. *2nd Class :* H. Alexander, V. Buckwell, M. Carmichael, J. Currie, A. Henderson, D. McGillivray, J. McLean, D. Taylor.

BARROW. *1st Class :* J. Round, J. Snowdon.

SOUTHAMPTON.—*1st Class :* J. Arbuckle, F. Hood. *2nd Class :* P. Adams.

LEITH.—*2nd Class :* J. Duncan, J. Ireland.

LIVERPOOL.—*1st Class :* A. Brent, W. Forsyth, H. Fuller. *2nd Class :* R. Jones, N. Martin, C. Rowlands, E. Scott, A. Wilson.

NORTH SHIELDS.—*1st Class :* A. Fraser, B. Wright. *2nd Class :* E. Gilderoy, J. Oxley, C. Robertson, A. Sorensen, W. Wailes.

CARDIFF.—*1st Class :* A. Bell, I. Dodds, E. Humphreys, G. Thomas. *2nd Class :* D. Jones.

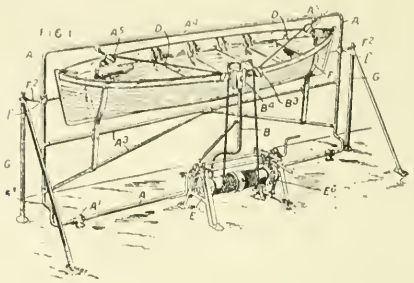
WEST HARTLEPOOL.—*1st Class :* A. Walker. *2nd Class :* H. Humes, R. Hunter, A. Longford, H. Price.

PLYMOUTH.—*2nd Class :* T. Hancock.

The Marine Engineer and Naval Architect Patent Record.

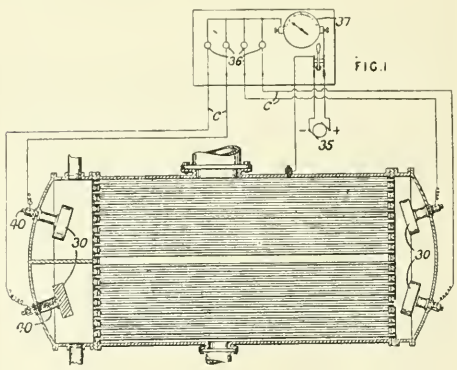
Compiled by Messrs. E. P. Alexander & Son, Chartered Patent Agents, 306, High Holborn, London, W.C.

14,962. Boat raising and lowering gear. Relates to davits of the kind made in the form of a hinged frame arranged to swing in and out from a single centrally disposed stanchion over which the fall ropes are carried, the fall ropes serving both to allow the davits to swing in and out as well as to control the boat. The invention consists in adapting the central stanchion to serve as a stop for the boat when inboard. The davits A, strengthened by cross members A3, A4, are pivoted at A1 and are splayed at A* so that they have an



initial tendency to swing outwards. The falls D are led from the boat hooks over single pulleys A5, B3 to a single-barrel winch E provided with a foot brake E6. The pulleys B3 are secured to a stanchion B having a lipped plate B4 which stops the boat. The inner chocks F are secured to the davit members A3, while the outer ones are pivoted at *f* to the davits and are provided with tail-pieces F2 which co-operate with fixed stanchions, whereby the chock is automatically brought into position and released as the boat is being raised inboard or being launched respectively.

19,637. Preventing corrosion in surface condensers, etc.—Electrical apparatus for preventing corrosion in a surface condenser or the like is provided with means whereby the amount of current passing to any anode in the condenser may be controlled separately and independently. The anodes 30 in the condenser shown are connected to the source of electricity 35 in parallel, and each line *c* is provided



with an adjustable resistance 36. An ampère-meter 37 is provided to indicate the total current in the circuits. An anode preferably consists of a circular iron body screwed to the condenser by a bolt 40, and insulated by washers and fibre sleeves around the bolt. The bolt is bored centrally to allow liquid to escape to give an indication when the anode has worn away.

The Marine Engineer
And Naval Architect.
LONDON, FEBRUARY, 1913.

PRIME MOVERS.

WE are sure that the delivery of the James Watt lecture, on the subject of "Prime Movers," by Mr. S. Z. de Ferranti, the well-known electrical engineer, under the auspices of the Greenock Philosophical Society, will have an interest which will extend far beyond the environment of that particular society. That this will be so, is not only due to the versatile character of the lecturer, but also to the fact that to Watt must be ascribed the invention of the real prime mover in its full potential sense, and on this latter ground alone the subject has special significance and interest in connection with an anniversary function associated with that great engineer. The lecturer referred shortly to matters of general history relating to the mechanical results obtained, which he properly stated had been dealt with on previous occasions, and then passed on to what those achievements cost James Watt and to the enormous difficulties he had to overcome before being able to utilise his inventions. Those who have read the life of James Watt, for example, that written by Mr. Andrew Carnegie, cannot but be impressed with the magnitude of the difficulties that beset his path in realizing the inventions which his genius had evolved, and we agree with the lecturer that one of James Watt's greatest achievements was the discovery of his partner, Matthew Boulton. But for this, it is open to doubt whether the science of the steam engine would have made the advance it did at the time, and the general trend of events might have been widely different. This feature of the lecture led up to the conditions which obtain to-day regarding the difficulties of inventors and the want of interest in anything new, and it was pointed out that the development of Germany was largely due to the intelligent use of scientific men by the commercial community; while the United States offered greater opportunities for those who were desirous of developing new things. In the opinion of the lecturer this country was not spending nearly enough in the direction of developing new ideas, and greater risks should be taken and more keenness should be shown in this direction. In dealing with motive power generally, the lecturer pointed out the of effect low and high negative work. For example, steam was a power having a large capacity for doing useful work, since the negative work of pumping water into the boiler was so small as to be practically negligible, and however inefficient the engine was it would go round and do some useful work. In addition, it could be used at low temperatures and pressures, and Watt's main work was the improvement of the efficiency of the Newcomen engine, to make it useful for general purposes. Along the line of development started by Watt, efforts have been made since his time in improving the efficiency of the conversion of the heat of the fuel into mechanical work. One of the greatest advances made was that of the application of the rotary principle to the production of motive power, by Sir Charles Parsons. Alongside of this development was another taking place, *viz.*, that of burning the fuel in the motive cylinder in the gas engine invented by Lenoir and improved on by Langen. Although both these arrangements had low negative work, for the reason that the charge was only sucked into the cylinder and not compressed before firing, the efficiency was low. Then came the suggestion of compressing the charge to increase the temperature and obtain a high ratio of expansion, but this involved high negative work, and in engines in which a separate air pump was used for compressing the charge the negative work became excessive. This was taken to such an extent in the first Diesel engine that so much power was required to overcome the friction and negative work that the engine would not drive itself, much less do useful work. The engine was then modified to a less theoretically correct form, and became the success that it is to-day. The result of experience up to date is that for small powers the internal combustion engine is in every way the best, and the other end of the scale can only be met by the turbine. Between the two extremes is a dividing line on which either form of engine might suit the requirement, but as the turbine got larger it was easier to construct and more economical to run, while as the gas or oil engine got larger the natural difficulties increased. It follows that as the turbine is reduced in power its economy falls off badly and the production of a satisfactory design was difficult, and on the other hand the internal combustion engine became a more satisfactory and economical machine in small sizes. From this it will be seen that this division of power between the rotary and reciprocating machine was almost a natural law, and those who sought to evade it must either invent some new principle or court endless trouble, expense and failure. After referring to the large expenditure that was continually being made in the manufacture of large gas and oil engines, the lecturer stated that although the successes in Germany were largely advertised, the many failures and breakdowns were little known of. Passing on, it was pointed out that although it was well known that high temperature of motive fluid gave high economy, such high temperature had proved very difficult to deal with, which is exemplified in the low working pressures of marine turbines. As the difficulties were largely mechanical and great advantages would accrue if they were overcome, the lecturer began experimenting some years ago, and after many failures has produced a turbine which, at the highest temperatures and with great and rapid variations of temperatures, was quite free from mechanical troubles, and to such

an extent was this so that unexpectedly the blade and clearance was so small as to be almost negligible from the point of view of leakage loss and the fear of blade stripping was entirely removed. The steam used was superheated initially, and after the first expansion, and while it was still superheated, it was re-superheated before it did its work in the second stage of the turbine. After this it was exhausted in a superheated condition through a regenerator to the condenser.

The blading was made of mild steel with a thin coating of pure sheet nickel, electrically welded on the surface. It was most accurately finished to shape by a process of step by step pressing under very heavy pressure, and was welded accurately in position. No balance dummy was used, although the turbine was of the reaction type, the whole of the end load being taken on a specially-constructed thrust so as to save steam leakage. The machine, which has been running for some time, is of 5,000 horse-power, and on running at two-thirds full power has given a shaft horse-power for 7 lbs. of steam. If the steam were supplied by an oil-fired boiler superheater system of 85 per cent. efficiency, which has already been exceeded in central station practice, it would consume less than ·625 lb. of oil per shaft horse-power. Judging from the tests that have already been made the lecturer was of the opinion that when the machine was run with full load under favourable conditions less than 6 lbs. of steam per shaft horse-power would be necessary, and that the system would have a thermal efficiency of over 24 per cent., which would represent an oil consumption of ·55 lb. per shaft horse-power. If the system is carried out on a large scale, it is estimated that an over-all thermal efficiency of at least 29 per cent. will be attained. Coming now to the possibilities of the future, it was pointed out that with a high temperature steam turbine of large size, generating electricity to supply power for all purposes on land, there was the advantage of a machine, having the highest efficiency, which was not limited to oil for its fuel. As improvements were made in the system there is no doubt that the whole of the coal used for firing these large units would be first gasified and the by-products recovered. This would result in an ample and cheap supply of fertilizer for the land and also enable a considerable quantity of tar oils to be available as liquid fuel for naval purposes, and thus relieve the country of the necessity for purchasing oil fuel abroad, and avoid the risk and cost which such purpose involves. Small internal combustion motor requirements would be met by an ample supply of benzol from the same source, which would be far preferable a solution of the fuel problem than the production of alcohol as has recently been suggested. It is recognised that the electric motor, having regard to its rotary character, is largely displacing all forms of small engine where a supply of power is available, and the rotary characteristic of this type of motor is a good illustration of the desirability, and even the necessity, of applying the rotary principle to an engine, and where such rotary principle can be supplied, it will most certainly displace any of the reciprocating prime movers. In conclusion, the lecturer expressed his difficulty in predicting the exact form of the prime mover in the future, but in searching for the highest economy, and having regard to the limitations of temperature imposed by known materials, he was inclined to look to electricity converting the energy of the fuel at low temperature, and giving its power in rotary form as the most likely eventual solution.

SAFETY AT SEA.

IN the early part of last month, an interim report of the Boats and Davits Committee was presented to Parliament, and, just as we are going to press, the Board of Trade have issued new rules relating to life-saving appliances. The rules will, with certain exceptions, come into force on March 1st, 1913, the main exception being with reference to requirements which involve structural alterations to the ship, in which case the rules shall not apply till November 1st following. To put the matter shortly, all foreign-going passenger steamers are to carry life-boats in such number and of such capacity as shall be sufficient to accommodate the total number of persons carried, or which the ship is certified to carry, whichever number is the greater. This deals with the public demand of "Boats for all." As to the handling of boats, provision is made that davits are not to be fitted in the bows, but the stowage of boats in the after-part of the ship will be allowed subject to the requirement that on being lowered into the water they must not be brought into dangerous proximity to a propeller. This course was entirely forbidden in the draft rules and its removal is therefore satisfactory. Provision is made for the Board of Trade taking power to accept any boat, raft, buoyant apparatus or other life-saving appliance, in lieu of life-saving appliances required by the rules. But such acceptance shall be subject to such regulations as they may impose, if they are satisfied that under those conditions the appliance will be as effective as the appliance required by the rules. With regard to life-saving appliances to be applied to the person, an approved life-jacket or other approved article of equal buoyancy suitable to be worn on the body shall be carried for each person on board foreign-going passenger steamers, while a sufficient proportion of such appliances shall be of a size suitable for children. A certain proportion of motor life-boats may be carried if desired, and all boats and other life-saving appliances must be kept fit and ready for use and fitted and arranged to the satisfaction of the Board of Trade.

"TITANIC" ENGINEERING STAFF MEMORIAL.

THE progress of this fund is shown by the following figures, which have been kindly supplied to us by the Hon. Sec. of the Committees :—

Institute of Marine Engineers, London, up to February 23rd	£2602	14	0
Southampton Committee (for the erection of a monument in Southampton), up to February 23rd	£1660	0	0
Liverpool Committee (for the erection of a monument in Liverpool) up to February 23rd	£5177	18	4
Total	£9440	12	4

Lord Justice Kennedy, who was in his day senior classic at Cambridge, and who has always taken a deep interest in everything concerning our mercantile marine, has written a beautiful set of Latin elegiacs, which are to be placed on the monument to the engine-room heroes of the *Titanic* at Liverpool. The Latin runs as follows :—

In memoriam duorum et triginta artificum nauticorum qui, quum navis, in qua mare Atlanticum navigabant, massae glaciali collisa, fluctibus mergebatur, fideliter usque ad finem laborantes, suo exitio aliis salutem praestiterunt.

Nox erat ; icta latus cursuque jacebat adempto
Navis, Atlantei dum maris alta secat,
Quam subito in tenebris moles glacialis euntem
Laeserat ; in vulnus prora bibebat aquas.
Confugit ad lintres vectorum turba ; pudori
Cui foret in tali clade petita salus ?
His aliter visum est. Peritura navis in ima
Parte suum impavidus quisque laborat opus.
Ante oculos letum est. Tamen haud deterret imago,
Ne fide maneant in statione viros.
Ossa tegit pelagus ; nullo mergitur in aevo,
Gloria pro sociis sic voluisse mori.

And the translation is also by Sir William Kennedy :—

"A tribute to the memory of thirty-two marine engineers, serving on board the R.M.S. *Titanic* on her maiden voyage across the Atlantic, who whilst their ship, struck by an iceberg, during the night of the 14th April, 1912, was sinking, worked gallantly to the end, and went down with her, willing to sacrifice their own lives in order that others might be saved.

'Twas night ; with riven hull, the iceberg's prey,
Their giant ship inert and helpless lay ;
Her prow sinks slowly to the sea's embrace,
From hold to hold invading waters race,
Passes to lowered boats a parting crowd——
Well might such scene the boldest heart have cowed !
But these it moved not. At his post below
Each stood and toiled. They marked the ceaseless flow
That drowned the fires, brought Death. But Duty called,
And they met Death in darkness unappalled."

W. R. K.

ENGINEERS AND THE NATIONAL INSURANCE ACT.

OWING to the contradictory comments and advice given in connection with the National Insurance Act, it is difficult to know exactly how marine engineers stand affected by it. On the one hand a finding was given to the effect that the watch-keeping engineers, whose pay and board amounted to over £160 per annum, were outside the Act in virtue of the major part of their duties being to direct, and, therefore, they did not come under the category of manual labourers. This finding, which was stated in our pages some months ago, appeared to be in accordance with the facts of the case and in keeping with the position and dignity of the responsible watch-keeping engineer, whose chief duty it is to direct and govern. Another view has been expressed, that the engineer is a manual labourer, because he goes round the machinery with an oil can. This may be so in the experience of some, but such action on his part does not constitute him a manual labourer any more than a rider who carries a saddle may be termed a horse ; the logic as to the occasional lubricating of a troublesome bearing constituting an engineer a manual labourer is quite as complimentary or complementary as the reference to the rider. All engineers have to do skilled work in the course of the overhaul of the machinery, whether watch-keeping or not, but the major part of their duties are such that the term manual labourer is a misnomer, hence the finding given in connection with the Orient Company appears consistent with the situation and with a sound appreciation of the position of the marine engineer. The description of the engineer as the man who goes round with the oil can did service, in popular parlance, last century, but has been obsolete for more than a generation, and should not be revived by any one who has even a slight knowledge of present-day marine engineering. The definition of a manual labourer may be somewhat difficult to set down for the purposes of the Act ; it is also difficult to describe the benefits which will be derived by a good proportion of engineers from the conditions set forth in the Act. Sickness when at a home port and maternity benefits are not the least of these as far as can be seen, with the pension looming in the distance as a beacon light to comfort the mariner in his declining years. A great many engineers have interests in life assurance and other societies, in some cases being encouraged by the company they serve to the extent of the management paying a more or less large proportion of the premium or paying the premiums for one on condition that another policy is taken out by their officers in the same or another society. It is a question for engineers to satisfy themselves whether or not the claims they have in other directions will vitiate the monetary benefits which would otherwise accrue to them through the National Insurance Act. The provisions of the Act already bear very hardly on some who come under it on shore, where employers now cease to pay wages during sickness on the ground that they are joint contributors to the National Scheme. It is only by careful and impartial investigation of cases that improvements can be introduced in the form of amendments or otherwise to the Act, in order to prevent that which is honestly intended for the national welfare becoming a burden to many, and tending to make the rich man richer and the poor man poorer. Many marine engineers have been paying, including chief engineers, with a protest, but acting under instructions, and if it is found, as seems to be the case, that these instructions were given in error, their payments should be refunded.

"The Determination of a Ship's Position at Sea by Wireless" was the title of a paper read recently by Mr. J. Erskine-Murray, D.Sc., before the Inst. of Engineers and Shipbuilders in Glasgow.

LIQUID FUEL.—In a lecture given recently before the Society of Arts by Prof Vivian B. Lewes, it was stated that the world's output of petroleum was about 50,000,000 tons p.a. During 1912, about 1,250,000 of products were imported into the United Kingdom, 70 per cent. of which came from America, while the Dutch East Indies, Roumania and Russia in the order named made up the bulk of the remainder. The percentages of the total oil produced were, United States of America 63·99 p.c., Russia 21·48, Galicia 3·87, Dutch East Indies 3 37, Roumania 2·97, India 1·87, Mexico 1·02, Japan ·59, Peru ·40, Germany ·32, Canada ·10, and other sources ·02.

WATT ANNIVERSARY CELEBRATIONS.

THE customary celebrations of the anniversary of the birth of James Watt were held, as usual, about the middle of January, and took the form, in Greenock—Watt's birthplace—of the Watt Lecture, delivered under the auspices of the Greenock Philosophical Society, and in Glasgow of the anniversary dinner under the auspices of the Institution of Engineers and Shipbuilders in Scotland. The latter function took place on the evening of Friday, January 17th, within the Banqueting Hall of the Grosvenor Restaurant, Glasgow. The "Watt Lecture," delivered the evening previous by Mr. S. Z. de Ferranti, whose address is perhaps the most weighty and emphatic deliverance on the subject of "Prime Movers" of the future that has been offered to the engineering world for some time, is the subject of comment in another part of this journal. The dinner was attended by a large proportion of the membership of the Institution of Engineers and Shipbuilders, by many representatives of kindred societies in different parts of the country, and a considerable number of guests, the company altogether numbering about 350. Mr. Ebenezer Hall-Brown, of Messrs. Richardsons, Westgarth & Co., Middlesbrough (until lately of Messrs. A. Rodger & Co., Govan), who is president of the Institution, was in the chair. The toast list was short, but it gave scope for speaking on different naval, military and civil phases of engineering practice, and the opportunities given them were well taken advantage of by the different speakers. Responding to the toast of "The Imperial Forces," which was proposed in fitting terms by Sir John Ure Primrose, Bart., Captain E. J. Fitzherbert, R.N., superintendent of Admiralty work on the Clyde, said that recent events had shown clearly the terrible plight of nations unprepared for attack by others adequately prepared. No one in this country believed that we would wantonly attack another nation, but what we had we would hold. All history showed that what was won by the sword had to be held by the sword. The officers and men of the Navy were, he was sure, endeavouring to make that Navy a weapon on which, in time of peril, its country would confidentially rely.

Sir J. H. A. Macdonald, K.C.B., who also replied, referred specially to the engineering department of the Army, and said that the engineers now had to manage the work of mechanical traction—a section of the military forces which would, he was sure, be a great power in the defence of the country—provided always that the best of mechanical vehicles were chosen for the Army, and that this section in the national defence was so organised that it could be made useful in the shortest time possible. The engineers had also now to conduct the "war in the air." They were hearing of the terrible effects of the excellent aiming by aeroplanists, who from their machines could aim at ships on the sea. He did not attach too much importance to the fact that an aeroplanist could drop a missile on a piece of whitened ground of the size of a Dreadnought's deck. In actual war things would be different. There was always a great deal more room to miss than to hit.

A feature of the evening's proceedings was the reading by the Secretary—Mr. Edward H. Parker—of cablegrams received and despatched from and to kindred institutions abroad. From Japan came:—"The engineers of Japan are to-morrow holding their anniversary meeting to commemorate the birth of James Watt, whose ingenuity has led to the development of the resources of Nature in so wonderful a manner, and this for the good of all, irrespective of race or country. They wish to express their sympathy with their honoured friends' meeting for the same purpose in the native land of the great inventor." The reply to this embodied the hope that "however the progress of human affairs may modify the old order of things nothing will ever arise to disturb the friendship between the engineers of Britain and Japan." From Calcutta came:—"The Calcutta and District Mechanical Engineers assembled at their annual dinner send fraternal greetings to the engineers of Scotland attending the James Watt anniversary dinner in Glasgow. Engineering girdles the globe, and we join you in honouring the memory of the giants of the craft." The reply to this reciprocated "the kindly greetings of the Calcutta engineers," and hoped that "the hinges of friendship between the two may never rust."

"The Immortal Memory of James Watt" having been honoured in silence, Lord Inverclyde proposed "Greater Glasgow," and took occasion to refer at some length to the question—now being much discussed—of the Clyde being brought under one body of management, whose jurisdiction would extend from Glasgow to the sea. Lord Provost Stevenson, in replying, also referred to the question and to the subject of the founding of scholarships in engineering and navigation at the Royal Technical College, Glasgow. Referring to the recent celebrations of the centenary of the launch of the *Comet*, and to the enthusiasm then shown he said it was surely a melancholy fact that after having agreed to celebrate the event in that way, very largely to enable the Technical College to have a training steamer at its command, and to found scholarships for the teaching of engineering and for the endowment of engineering research, there was actually more money spent on the celebrations than this great community had been able to gather in order to found these scholarships. He hoped that Glasgow would rise to the occasion, that the Technical College would not be left in the lurch in this wise departure which it was making, and that Glasgow would enable the College to do something tangible and permanent to commemorate the birth of steam navigation on the Clyde.

Replying to the toast of "Kindred Institutions," which was proposed by the chairman, who dwelt on closer union between various engineering bodies, Sir Charles A. Parsons, K.C.B., president of the North-East Coast Institute of Engineers and Shipbuilders, said the objects of that Institution were very similar to those of the Scottish Institution, and he would advocate strongly that they should have closer relationships. He did not think they themselves realised what an important part they had taken in the commercial development of their country, and what a great responsibility rested upon them for maintaining its supremacy. He did not agree with Captain Fitzherbert when he said that we had won our great possessions by the sword. He maintained, and he thought rightly, that we had won our possessions because we had been at peace when the other nations had been fighting, and that we had won our present position by scientific and commercial enterprise.

An interesting vessel named the *Hardinge* was launched on January 23rd, by Messrs. A. J. Inglis, on the Clyde, for one of the Indian Railway Companies, to ply as a connecting link between the mainland and Ceylon, to carry passengers and merchandise from the trains at the termini across the intervening seaway. The *Hardinge* is one of three steamers ordered from Messrs. Inglis for this special service, and is 260 ft. × 38 ft. × 19 ft., to be fitted with geared turbines on twin-screws. Each set of engines consists of H. and L.P. turbines, geared down from fully 3,000 R.P.M., to about 450 R.P.M. on the propeller shaft. The boilers are of the water-tube type, by Messrs. Yarrow.

SPECIAL JANUARY NUMBER.—Only a few copies of this number containing the complete details of Shipbuilding and Marine Engineering for 1912 are in stock and may be had by applying to the Publishers.

Messrs. James W. Carr & Co., Ltd., of 35, Queen Victoria Street, have issued a new brochure relating to their milling cutters, reamers, gauges, etc., and will be pleased to supply copies of the pamphlet to users on application.

Vulcan-Werke, of Hamburg and Stettin, have sent us an illustrated book describing their works and productions. There are several whole-page illustrations showing the shops, vessels and engines built, and two views of the entire works. An interesting feature is a series of illustrations showing the progress of construction of the "Imperator" which the Company have on hand. The German Dreadnought *Rheinland*, of over 18,000 tons displacement and built at Stettin, has a double-page illustration of good appearance. The resources of this Company, enabling them to cope with all classes of work, as shown by their publication are very great. The book, which is well printed and produced, forms interesting reading.

THE JAPANESE BATTLESHIPS "KAWACHI" AND "SETTSU."

THE *Kawachi* and *Settsu* represent Japan's first attempt at "Dreadnought" construction, the preceding *Aki* and *Satsuma*, with their four 12-in. and twelve 10-in. guns, being now regarded as enlarged "Lord Nelsons," although at one time they were included in tables of "Dreadnoughts" along with the French "Dantons."

In design the *Kawachi* is a direct linear descendant of the little *Fuji* of 1896, and the gradual growth in size and power can be traced through the *Asahi*, *Mikasa*, *Katori* and *Satsuma* classes, the gun positions remaining approximately constant and the calibre and number of pieces being modified as the secondary battery rose from ten 6-in. to fourteen in the *Asahi* and *Mikasa*, then to four 10-in. and twelve 6-in. in the *Katori*, twelve 10-in. and twelve 6-in. in the *Satsuma*, and finally in the *Kawachi* the 12-in. replace the 10-in. and ten 6-in. form the secondary battery. In all there has been a main deck battery of 6-in., and the change has been in the substitution of heavier weapons in the upper deck positions.

Originally the *Kawachi* was to have had fourteen 12-in.—three guns in the two axial turrets and four double-wing turrets as now. It is, however, doubtful whether construction was commenced on her on these lines—the triple turret was as then untried although it had appeared in several projected ships as the German *Nassau* of 1906, and the Italian *Dante Aligheri*, etc. With twelve 12-in., the ship is practically a sister on general lines to the *Nassau* and *Helgoland* and possesses few features of interest.

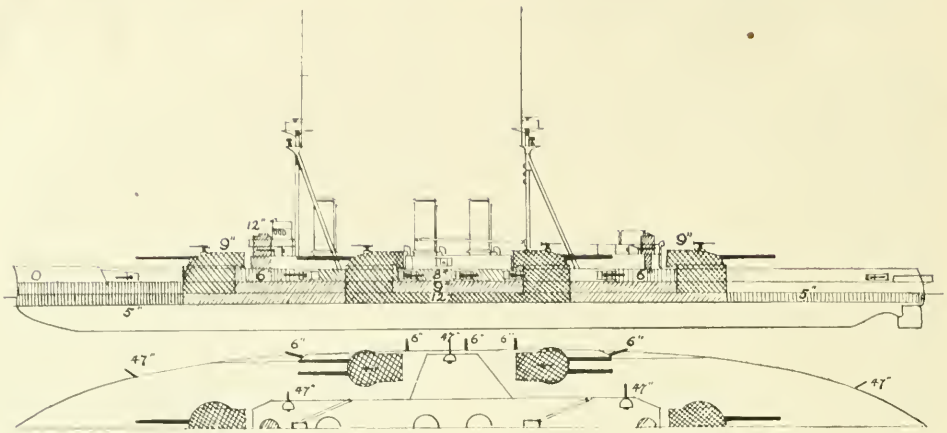
The disposition of the six turrets can be seen from the plan, and is the most inefficient and extravagant method of gun placing yet devised, only eight can be trained on the broadside and six axially, whereas along *Moreno* lines, with super firing and *en echelon* placing, all twelve could have been brought to bear abeam and eight axially.

It is probable that the same principles governed the drawing up of the plans as obtained in the case of the earlier German "Dreadnoughts"; the desire to work along recognised lines and avoid originality and possible failure rather than strike out into the novel and unknown. Thus the *Kawachi* is an enlarged *Satsuma*, with 12-in. instead of 10-in. guns in the wing turrets—the amidships pair being suppressed—and a slightly stronger, smaller armament. The 12-in. are of 45 calibres and fire an 850 lb. projectile, the ten 6-in. and ten 4·7-in. are 50 calibres, with 100-lb. and 45-lb. shells respectively. Incidentally it is not quite certain whether eight or ten of these latter guns are carried. There are two in the bows and stern and two in each superstructure, but whether the port amidships between the wing turrets holds a 4·7-in. or not does not seem to be agreed upon. We have included it, as it is more probable than not.

The standard Japanese armament of five tubes, all submerged, is fitted, and these fire the 18-in. torpedo. One is in the stern, the rest on the broadside.

As regards protection, the main belt extends from bow to stern and is 12 in. amidships and 5 in. at the extremities. Above this is a second strake of similar thickness forward, 9 in. amidships, and stopping short at the base of the aftermost turret. The battery varies from 8 in. to 6 in. All the turrets are of 9-in. armour and the bases of the same thickness. Eleven inches is often given as the big gun protection, but this is now thought to be incorrect—the Japanese have never

Japanese Battleship *Kawachi*.



Plan of the Japanese Battleship *Kawachi*.

plated their big guns with more than nine inches, which they recognise as adequate protection.

The dimensions are:—length 479 feet (waterline); beam 86 feet, and draught 28¼ feet (maximum), giving a displacement of 20,750 tons. Driven by turbines of 25,500 h.p. (*Kawachi* has Curtis 3-screw, and *Settsu* Parsons 4-screw), the designed speed is 20·5 knots, which was slightly exceeded on trial. The boilers are of standard Miyabara type, and the fuel capacity is 900—2,500 tons of coal.

The *Kawachi* was laid down at Kure in January, 1909; launched in October, 1910; and commissioned in August, 1912. The *Settsu* has only recently joined the fleet, having been commenced at Yokosuka in April, 1909.

On account of their peculiarly spaced funnels and tall tripod masts they have an uncommon and easily distinguished profile. The bow is not of the usual pronounced "swan" variety, so affected by the Japanese, but is almost straight.

These are the last ships to carry 12-in. guns now being built for the Japanese navy, the *Kongo* class of four ships being fitted with 13·5-in. and the *Fuso* with 15 in. weapons.

In comparison with their contemporaries carrying the same armament they do not show up well, but it is questionable whether the triple turreted Austrian, Italian and Russian ships will gain such a superiority by their augmented broadside fire as might be inferred from theoretical grounds.

COMPARATIVE TABLES.

Power.	Vessel.	No. in class.	Displacement (tons).	Designed h.p.	Designed Speed (knots).	Armament.	Torpedo T'bs	Protection. A	B	C	D	E	Bearing of Big Guns. Axially.	Beam.
								in.	in.	in.				
BRITISH ..	*Neptune*	3	19,250	25,000	21	10—12 in. 16— 4 in.	3	11	2¾	9¾	12—8 in.	0	8—6	10
ARGENTINE..	*Moreno*	2	27,940	39,500	22·5	12—12 in. 12— 6 in. 12— 4 in.	4	10	2½	8	10	6	8	12
AUSTRIA ..	*Viritis Unitis*	4	20,000	25,000	20	12—12 in. 12— 6 in.	4	11	1¾	8	12	6½	6	12
FRANCE ..	*Jean Bart*	4	23,026	29,000	20	12—12 in. 22—5·5in	4	10½	3	7	12—9 in.	7	8	10
GERMANY ..	*Kaiser*	5	24,500	28,000	21	10—12 in. 14— 6 in.	6	13	3	8	11	7	8—6	10
ITALY	*Dante Aligheri*	1	19,400	26,000	22	12—12 in. 20—4·7in	3	10	2½	8	12	4	3	12
JAPAN	*Kawachi*	2	20,800	26,000	20·5	12—12 in. 10— 6 in. 10—4·7in	5	12	3½	9	9	6	6	8
RUSSIA ..	*Poltava*	4	23,000	42,000	23	12—12 in. 16—4·7in	4	11	3	8	12—10in	5	3	12
U.S.A. ..	*Arkansas*	2	26,000	28,000	20·5	12—12 in. 21— 5 in.	2	11	3	10—8	10—8 in.	6½	4	12

A—Belt amidship. B—Protective Deck. C—Side above belt. D—Big guns. E—Secondary guns.

since the oil can be carried long distances in pipes. Of the work in hand, there are still to be noted delays in the provision of material, although we do not suffer from a shortage of men, complaints of which are made at other yards. The *Fearless*, probably the last of the *Boadicea* class, is making fair progress, and the *Nottingham* is also showing signs of the labour which has been put into her. An oil-ship, the *Trefoil*, has been begun during the month, and orders have been received for the construction of two battle-practice targets, which are practically small ships. The *Amphion* is still away owing to the delay in carrying out her trials.

ARTIFICERS AND STOKER-MECHANICIANS.

The subject of the stoker-mechanician has been again brought forward on behalf of the artificers of the navy, many of whom are skilled practical engineers. The anomalous position created by the elevation of the stoker-mechanician class has been previously referred to in these pages, and it is evident that the position has not improved with the lapse of time; the wait and see assurance policy has shown the justification of the views expressed by engineers against certain portions of the clauses, relating to the stoker-mechanician, and especially against those which may place him in charge to direct trained practical engineers in duties to the discharge of which, in detail, they have fitted themselves by training and experience. A smattering of workshop practice for the short time stipulated to elevate a stoker into a stoker-mechanician, cannot give him the necessary grasp of engineering details to qualify for a charge man over a trained engineer, and surely an arrangement more in keeping with the fitness of things might have been made or have suggested itself in order to give promotion to the best men in the stoker class, a desirable enough object, without setting by the ears an equally deserving class who have had years of training to equip them for their duties and naturally resent the idea of being dictated to by amateur tradesmen.

SYDNEY, NEW SOUTH WALES.—The retirement, in November last, of Mr. Robert Pollock, engineer-surveyor to Lloyd's Register, after about twenty-five years' service, was celebrated at Sydney in a manner which was conclusive proof of his popularity, and of the respect in which he was held by all those who were brought into contact with him. Sydney, Melbourne and Newcastle combined to do him honour, and the dinner at which he was the honoured guest was attended by quite 200 engineering and commercial well-wishers and friends, who combined to present him with some tangible tokens of their esteem. Prior to taking up the appointment of engineer-surveyor Mr. Pollock served in several steamers running on the Australian and New Zealand coast service and was chief engineer of the *Ruahine* some forty years ago. His successor at Sydney—Mr. Heron from Japan, and his assistant—Mr. Robertson, formerly chief engineer in the Aberdeen Star Line (Messrs. Thomson), were warmly welcomed on entering upon their new duties.

THE "CARPATHIA" ENGINEERS' PRESENTATION.—On December 13th, interesting presentations took place in the Council Chamber, Liverpool, to the engineers and engine-room staff of the Cunard liner *Carpathia* for their services in assisting at the rescue of the survivors of the ill-fated White Star liner *Titanic*. Chief-Engineer A. Johnstone received a cheque for a considerable sum and a handsome piece of plate, suitably inscribed. Gold watches were presented to 2nd Engineer H. Marshall, 3rd Engineer T. Holmes, and 6th Engineer J. Richardson. 4th Engineer W. Fairhurst, 5th Engineer J. McManus, 7th Engineer D Colquhoun and 8th Engineer T. Gould were away at sea, but they will also receive gold watches. Electricians Chas. Kennedy and R. Grant will each have a gold scarf pin, and forty-eight greasers, firemen and trimmers £1 each. The presentations were made by the Lord Mayor of Liverpool, who was accompanied by the Lady Mayoress and also by Mr. H. T. Sanderson, Mr. Thomas Royden, Mr. J. H. Beazley and Mr. J. Willett Bruce. The handsome presents were the outcome of the efforts of a Ladies Committee, who had been working for a considerable time past in the interests of the *Carpathia's* engineers, the members of the committee being very warmly thanked at the end of the day's proceedings.

THE "FIRE-KING" SPRINKLING SHOVEL.

OUR attention has been called to a firing shovel which has been acceptable for hand-fired boilers on shore and is now advocated with some show of reason for marine boilers. The primary object for which the shovel was designed was the distribution of very small coal over the fire, with a view to maintain an even surface and avoid each fill reaching the fire in a heap, or to use the expressive term, "piling it on." The advantage to be gained by sprinkling, rather than by heaping, fuel on a burning fire, is obvious in the interests of economy, and if this advantage can be gained by the adoption of a shovel which assists towards this end, a great point is gained and hand firing is brought nearer to the mechanical stoker. The shovel is made of good sheet steel and corrugated; it is thus stronger than the ordinary shovel. The necessity for sprinkling the coal to get the most out of it, arises when the fuel is very small, as is often the case in land practice, but the supplies to steamers, at many ports, are frequently small enough to make it desirable to gain the advantage by the use of a special shovel which will, at least, assist in the direction of spreading the coal over the grate surface more evenly than an ordinary one.

The "Fire-King" Shovel.

THE INSTITUTE OF METALS.—PROGRESS OF CORROSION RESEARCH.—As was announced at the autumn meeting of the Institute held in London in September last, the annual general meeting of the Institute, which in former years has been held in January, will take place in the spring, the dates selected by the Council being March 11th and 12th, 1913. By the courtesy of the Institution of Mechanical Engineers the meeting will again take place at Storey's Gate, Westminster, S.W. In the evening of the first day the fourth annual dinner will take place. Amongst the papers that will be presented will be Dr. G. D. Bengough's second report to the Corrosion Committee, in which he will deal with the results obtained from the experimental condenser which has been running continuously at Liverpool since the beginning of April. Various data have been collected concerning temperature, amount of water condensed, vacuum, etc., which show that the conditions to which the condenser tubes have been subjected reproduce, as closely as can be expected, average conditions of service in the mercantile marine. The research into the causes of the corrosion of condenser tubes, which is costing £100 per annum, will not be completed for another two-and-a-half years. As the funds at present in hand will not permit of the research being carried on beyond the end of the present year, the committee earnestly hope that individuals and firms interested in the subject will afford the necessary financial assistance, which should be sent to Mr. G. Shaw Scott, M.Sc., the Secretary of the Institute of Metals, Caxton House, Westminster, S.W.

THE SPONTANEOUS COMBUSTION OF COAL.

At the Institute of Marine Engineers on January 29th, a paper was read by Mr. James E. Milton (member) on the "Spontaneous Combustion of Coal." Mr. Alexander Boyle (Vice President) occupied the chair. In the course of his paper, which treated the subject very exhaustively, Mr. Milton detailed the results of researches and investigations by Dr. Richters, M. Henri Fayol, M. Barrow, Professor Vivian B. Lewes, the British Royal Commission of 1876, and the Royal Commission appointed by New South Wales in 1897. Among other conclusions derived from a consideration of these investigations, the author said it would appear that all classes of coal, bituminous or anthracite, absorbed oxygen to a greater or lesser degree. This absorption was accompanied by development of heat, an action which would be progressive if the heat was not abstracted as quickly as it was generated. All classes of coal were therefore liable, given favourable conditions, to spontaneous ignition. These conditions were dependent on the air supply, surrounding temperature, kind and size of coal.

The through ventilation of a coal cargo was impracticable, and surface ventilation, supplemented as it frequently was by the opening of the hatches in fine weather, might aid the spontaneous generation of heat by supplying a slow current of oxygen through the mass of the coal. Efforts should be directed towards reducing the air supply in holds to a minimum. Bunker coal required different conditions from that forming a cargo. The inflammable gases evolved from the coal when freshly worked or broken, and which when mixed with air in certain proportions became explosive, necessitated ample ventilation of the bunkers, both before being entered with a naked light and during the whole time they were being worked.

A rise in temperature of the coal increased the amount of gas evolved, and, as large coal was less liable to heating than small, the shoots supplying the bunkers should be so arranged that the small coal could not accumulate in any part of the bunkers at which a higher temperature than normal might be expected. In places where high temperatures were to be expected, a thorough damping of the coal would assist in preventing danger of spontaneous ignition. Limbers in bunkers required special attention to ensure that they were tight.

In opening the discussion which followed, Mr. J. Shrinks commented on the value of the paper in view of the small amount of reliable information on the subject available up to the present. There was, he said, a general impression that the presence of moisture in the coal was favourable to spontaneous ignition, a belief which had been supported by the Royal Commission of 1876, but which had been proved to be unfounded. He considered that holds might be hermetically sealed and inert gases injected as a preventive. It was evident that a probable cause of spontaneous combustion was the breakage of the coal under the hatches during shipment. He cited instances where a tendency to spontaneous combustion had been checked by insulation of the bulkheads in close proximity to the boilers.

Mr. R. Balfour considered that the whole crux of the matter was contained in the results of M. Fayol's experiments, which proved that the prime essential cause of spontaneous heating and combustion of coal was the absorption of oxygen from the air by the coal, and that the conditions most favouring the heating of any coal were, a mixture of pieces and powder, a high temperature, a large mass and a certain quantity of air. He referred to the damage done to ceiling and hatches, which accounted in some degree for the introduction of oxygen, and he emphasized the necessity of ensuring that the limber hatches were perfectly tight.

Mr. G. Shearer said he had always found it of advantage to damp the coal in the working bunkers. He had found from experience that it was generally at the bunkers nearest the boilers where the tendency to spontaneous combustion was greatest.

Mr. W. McLaren considered that surface ventilation and weather conditions had a decided effect upon the spontaneous combustion. He did not agree that the practice of wetting the coal was a good one.

Mr. J. T. Milton pointed out that the chief value of the paper lay in the fact that it contained a large amount of information which had been obtained with great difficulty, and from sources which were now almost inaccessible. Of particular value was the record of experiments by M. Favol, who, among other things, had disproved the theory of Dr. Richters that the amount of oxygen absorbed was proportionate to the amount of hydrogen in the coal, by showing that anthracite, which had practically no hydrogen, absorbed a considerable amount of oxygen. Mr. Fayol had also shown that all classes of coal were liable to spontaneous ignition. Many people were still under the impression that wet coal was dangerous, although this was not the case.

The meeting closed with a vote of thanks to the author, on the proposal of the chairman, seconded by Mr. G. Shearer.

DUTCH SHIPPING EXHIBITION.

In the first Dutch Shipping Exhibition, which is to be held at Amsterdam from next June to September, there will be an important British Section. The exhibition, which is not run for the purpose of making profits, and of which the officials are honorary, has met with the greatest enthusiasm in Holland, a country which has always held a prominent position in the shipping world. The Prince of the Netherlands and all the Dutch Ministers of the Crown are patrons of the movement, and the Corporation of that city of ships, Amsterdam, are supporting the endeavour. The exhibition grounds are on the north side of the Y Canal, opposite to the Amsterdam Railway Station on the south side, and, for the convenience of visitors, there will be a constant service of steam and motor ferry boats between the two banks. For the British section—already an assured success—a special pavilion is to be erected in a most favourable spot. H.S.H. Prince Alexander of Teck is the principal patron, and other patrons are:—The Duke of Somerset, The Marquis of Bristol, The Marquis of Ailsa, The Marquis of Graham, The Earl of Dunraven and Mount Earl, K.P., The Earl Brassey, G.C.B., Lord Claud Hamilton, M.P., Lord Reay, K.T., Lord Nunburnholme, D.S.O., Lord Pirrie, K.P., Lord Leith of Fyvie, Lord Mersey, Sir Andrew Noble, Bt, Sir Marcus Samuel, Bt., Sir Walter Runciman, Bt., Sir Thos. Sutherland, G.C.M.G. (P. & O.), Sir Owen Philipps, K.C.M.G., Sir Swire Smith, J.P., Sir John H. Luscombe, J.P. (late chairman of Lloyd's), Sir Edward Hain, J.P., Messrs. Charles E. Brightman, George McLaren Brown (C.P.R.), Howard Houlder, G. B. Hunter, J.P., D.Sc., F. Clare Melhado, F.C.I.S., Albert Vickers, and J. A. J. de Villiers, of the British Museum. The Chairman of the British Executive Council is Mr. W. R. Bisschop, LL.D., and other members are Sir Ernest Shackleton, C.V.O., Messrs. Charles W. Gordon, chairman of the Shipowners' Society, Henrik Loeffler, David G. Pinkney, T. G. Owens (special director of Messrs. Vickers, Ltd.), and F. Shadforth Warts (Port of London Authority). The manager of the British section is Mr. J. Vandersteen, whose offices are in Sardinia House, Kingsway, W.C.

White Star Marine Superintendent.—Capt. R. Lobez, R.N.R., has been recently appointed Marine Superintendent at Queenstown.

New Invention by Herr Foettinger.—This famous German engineer has just made successful experiments at the Vulkan Yard of a new invention for propelling ships with steam turbines. The steam turbines set a pump in motion, which, in turn, drives a water turbine, this latter acting on the propeller shaft. The water turbine is reversible, and the reversal of the propeller's direction is very simple. It is claimed that 90 per cent. of the energy developed by the steam turbine is utilized. Trials were made with machinery of 7,800 I.H.P., which ran without break for fourteen days and nights. The invention is to be practically tried on one of the Hamburg-American Line boats.

THE FLEETS OF THE MAIL LINES.

(*From our Own Correspondent.*)

United States Wireless Law.

THE cases already referred to in this column in which British shipmasters have been charged before the United States courts with violation of the provisions of the new Act of Congress, which lays onerous obligations upon a large number of vessels, American or foreign, which trade to United States ports, have so far ended in favour of the defendants. Thus, in the case of the British steamer *Sokoto*, which in December, 1911, and again in February, 1912, entered the port of Newport News not being fitted with a wireless installation, the master has had the charge brought against him dismissed. The ground upon which the defence was successfully maintained was that the ship never came within the scope of the Act, because she was not "an ocean-going vessel of the United States or of any foreign country, carrying passengers and crew to the number prescribed by the statute," inasmuch as she only put into the port named for bunker coal, and did not either embark or disembark passengers or crew or cargo.

In the cases brought against the masters of the British steamships *Numidian* and *Winifredian* the prosecutions have been withdrawn by the authorities, it having been shown to their satisfaction that the failure to obey the law was due to the fact that the installations, whose specifications were equal to the requirements of the inspectors, had been ordered in due time and should have been delivered. The delay in delivery was due to no fault of the master or owner of either vessel, but simply to the pressure put upon the contractors by the demand for wireless installations, a demand greatly accentuated, of course, by the operation of the very law under which the prosecutions had been launched.

The International Mercantile Marine Company.

The rumours which for so long have been circulated with reference to the impending resignation of Mr. Bruce Ismay from the presidency of the combine, have now received official confirmation. Early in January it was formally announced that at the end of June, 1913, Mr. Ismay will hand over the reins to his lieutenant, Mr. Harold Saunderson, who in the meantime is taking a six months' holiday to prepare himself for the new responsibilities which he is to assume. Mr. Ismay, though vacating the chair, will not, as far as at present appears, resign his connection with the combine, as he is still to be a director and a member of the British Committee which controls the movements of the Company on this side of the Atlantic.

The Greek Mercantile Marine

has sustained a serious loss in the fate of the fine steamship *Macedonia*, which was shelled by a Turkish cruiser in the middle of January as she lay in the harbour of Syra. The *Macedonia* had been taken over for use as an armed transport by the Greek Government—a task for which she seemed eminently suited. Unfortunately the Turkish aim was so well directed and so successful that the vessel was set on fire, and the conflagration was not extinguished for a whole day. The vessel's upperworks were consumed and she now lies partly sunk. She was only recently added to the fleet and, being intended for the passenger trade between the Levant and New York, had accommodation for a large number of passengers, so that she was well adapted for transport work. She was built at Sunderland by Messrs. James Laing and Sons, and was of 14,000 tons gross register, being the largest vessel not only in the fleet of her owners—the Greek National Steamship Company—but also in the Greek mercantile marine.

The Galway Route.

Those interested in Galway and the West of Ireland generally do not seem to despair of eventually attracting the highest class of mail steamer to the port. A bill has been deposited with a view to the obtaining of the necessary Parliamentary powers to warrant the construction of a railway 4½ miles long for the purpose of joining the site of the proposed harbour with the main line of the Midland Great Western Railway of Ireland. The promoters of the bill further seek to build two piers in Galway Bay for the purpose of creating their intended harbour. The scheme as at present outlined will cost very nearly a million and a half for actual works, whilst a sum of about £150,000 is to be provided for the purpose of paying interest on capital during construction, as power is sought to take five years over the completion of the railway and no less than ten years for the building of the piers.

The Atlantic Line Routes.

We are again approaching the season when ice may be expected to be encountered on the Atlantic Ocean and, in view of the terrible lessons which were inculcated last year,

UNITED STATES TWIN SCREW ARMY TRANSPORT "MERRITT."

Built to the order of United States Army Quartermaster's Department, Manila, P.I., by The Shanghai & Dock Engineering Co., Ltd., late Messrs. S. C Farnham, Boyd & Co., Ltd., Shanghai, 1912. Length over all, 300 ft; length between perpendiculars, 285 ft.; breadth moulded, 28 ft. 3 in.; displacement loaded, 4775 tons. The vessel is fitted with two sets of Triple Expansion Engines, and the speed on trial was 13¾ knots per hour.

An example of shipbuilding in the Far East by Chinese labour under British supervision.

the White Star Line announces that an agreement has been reached between the principal steamship companies using the routes. The new arrangements will be as follows :

"*West bound :* Steer from the Fastnet or Bishop's Rock on a Great Circle course to cross longtitude 47 W. in lat. 41°N. Thence to port of destination. *East bound :* Steer as per regulation course from port of departure to cross longitude 47 W. in lat 40°N., thence by a Great Circle course to the Fastnet or Bishop's Rock."

The effect of this arrangement will be that vessels bound in either direction will, during the ice season, cross long. 47°W., one degree further south than was the practice during the first three months of the year 1912, and it is hoped that this alteration will be successful in eliminating all serious risks from ice.

THE "NARRUNG."

"BE sure of your facts" is advice sometimes overlooked by those who attempt to give a strained view of matters they know little or nothing about, and if we may judge the whole from the part, invective rather than logical argument forms the staple food thought of some, who, from the positions they occupy, ought to know better. The country has been treated with a great deal too much of that utterance which comes under the class referred to during the past year or two, and an early start was made in the beginning of the new year in connection with the buffeting sustained by the *Narrung*. The condition in which the ship arrived back into the Royal Albert Dock bore evidence of the fierceness of the gale and the heaviness of the seas she had encountered, while the strenuous work and efforts on the part of all hands to bring her back to port, and, as far as possible, secure the comfort and safety of the passengers must have been sufficiently manifest to any thoughtful minded man, even though his own experience of the sea had been confined to the Channel and the coast land around. Those who know from dearly bought experience what it means in the engine-room and stokehold to do the utmost to keep the bilge clear and the fires going when the water is lapping greedily at the furnace mouth, can readily realize the position of the engineers and their anxiety to keep sufficient steam to move the propeller the number of revolutions necessary to maintain steerage way on the ship, and help to keep her manageable to avoid seas breaking over amidships. There was a further anxiety in the engine-room in connection with the passengers—already with disturbed nerves—as well as as with the navigation of the ship herself; that was to keep the electric light machinery free from the water lashing about, and preserve the light, as had this failed the resulting darkness would have considerably aggravated the perils of the situation. It is within our recollection to have had an experience of a nature somewhat similar to, but more severe than, that which befel the engineers of the *Narrung*, and with this difference that it occurred in the China Seas during a typhoon, when the engine-room and stokehold were flooded, with the stokehold plates adrift and washing about. In such circumstances a mede of thanks and praise is due to the engine-room staff below who do their duty with all their energies, facing difficulties and dangers in the depths, all unknowing the conditions on the decks above. The state of the deck machinery of the *Narrung*, as we witnessed the ship re-entering the dock at Gallions, looked very bad, the refrigerating machine being seriously damaged and the crushing strain arising from the great mass of water which fell upon the deck, having exposed the thermometer tubes; and these appeared as projections dotted over the undulating surface. Two of the steam winches were torn bodily from their foundation and along with the plates to which they were bolted, hurled to one side and only saved from a discharge overboard by the ship's rail and rigging gear—the connecting pipes being broken. These winches were lifted ashore, after the ship was brought into dock, and landed on the jetty as shown in the photographs we had taken and now reproduce as a memorial of a unique case. The damage done to the forward part of the ship has proved to be of so serious a character that the insulation is being stripped from the hold and the refrigerating plant removed, as it suffered severely when the winches were torn away with the deck plating under which this machinery was housed. The necessary repairs are well in hand to refit the steamer for further service as soon as may be consistent with the overhaul, possibly without the refrigerating plant, on account of the damage done to it, necessitating extensive renewals which would involve considerable delay.

Photo. M. E. & N. A.

Deck View of the *Narrung*.

TWO BOATS FOR BRITISH INTERNATIONAL TROPHY.—Mr. H. Hollingsworth has ordered from Messrs. J. W. Brooke and Co. a second boat for the B.I. Trophy, the first boat is a displacement craft, and the second one a hydroplane pure and simple. Mr. Hollingsworth is anxious to ascertain which form of craft is most suitable for all-round work. The first one is built up to the limit of the class, *viz.*, 40 ft. long, and is now well forward, being completely planked, and the engine bearers are being got ready for the engines. The two sets of eight cylinder "Brooke" engines for the first hull will be placed in the boat *en echelon*, driving twin propellors. It is anticipated that the displacement hull should be running at the commencement of February, and she is, of course, to go to Monte Carlo in April. In design this first hull, which is to be known as *Cordon Rouge Majeur*, is very like Mr. Hollingsworth's 21 footer *Cordon Rouge II.*, which is also going to Monaco, and is equipped with one of the "Brooke" four-cylinder 21ft. class engines. This boat has recently been doing some extraordinary speeds. The second hull for the B.I. Trophy is already well under way, and should be running within the next two months. This hydroplane, to be known as *Crusader*, although having the same beam as the displacement boat, is not built up to the limit length. The comparative results of these boats using similar engines should be most interesting.

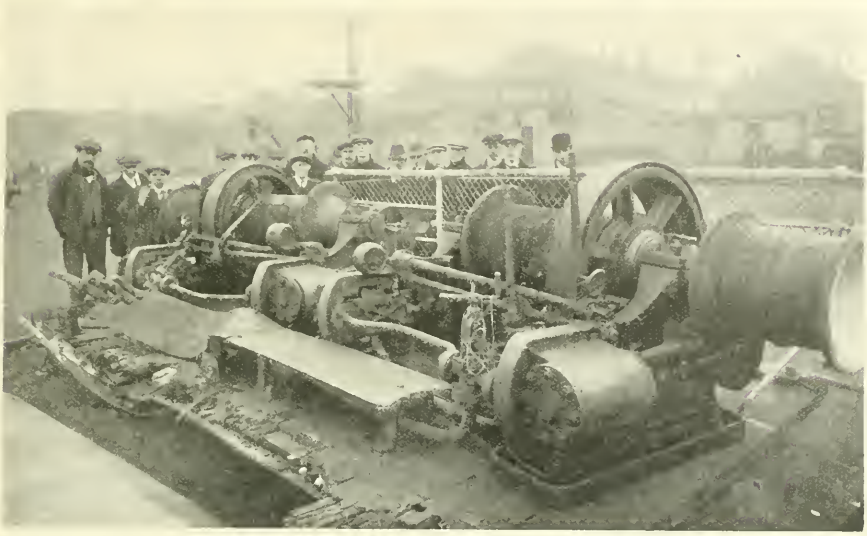


Photo. M. E. & N. A.

Steam Winches from the *Narrung* at Albert Dock. (See text.)

SHIPPING DISASTERS.

SHIPPING disasters have been the rule during the last few weeks, and whilst some of them have been serious indeed, others have tended to show to those who understand—if others have not read the lesson aright—that the science of shipbuilding and of navigation—using the latter term to cover both the work of the navigator and the engineer—have greatly progressed towards the goal of attaining safety under all probable conditions.

The "Narrung."

First of all we had the case of the P. & O. Company's branch liner *Narrung*, badly damaged forward by the onslaught of a series of heavy seas off Ushant and compelled to put back to the Thames. The getting the ship round and putting back under such conditions and the bringing her to her home port without the taking of assistance was a feat worthy of great commendation, and it speaks well for the builders of the ship, as well as for those who had charge of her.

But in a certain section of the press, and even in the House of Commons, opportunity was taken to make an onslaught on the character of the vessel as being a sister ship of the *Waratah*. Those who took this line of criticism either failed to acquaint themselves with the details of the two ships or had a confused notion of what sister ships are. For save that both the *Narrung* and the *Waratah* were originally built to the order of Mr. William Lund, and were built of steel, there seems to be little in common between them We append particulars of the pair in tabular form.

	Narrung.	*Waratah.*
Year built	1896	1908
Place of Build	Sunderland	Glasgow.
Tonnage, gross	5078	9339
,, nett	3170	6004
Length	400 ft.	465 ft.
Breadth	47·6 ft.	59·45 ft.
Depth to main deck	20·2 ft.	—
,, upper deck	28·4 ft.	35·05 ft.
How propelled	Single screw	Twin screws.
Highest decks	Spar deck	Spar deck and boat deck
Number of bulkheads	Six.	Seven.

Another point made against the *Narrung* by these ill-informed critics was her age. This of a vessel built in the year 1896! The absurdity of this contention need not be more than mentioned in a journal such as this. But the fact of the matter is that the public does not realize what the violence of the sea really is when conditions by no means unprecedented are encountered. Few of the famous ships of the big North Atlantic lines have failed at some time or other to encounter phenomenal seas and sustain serious damage. The old *Germanic* of the White Star Line once had the front walls of her smoke-room battered in by a steam winch torn up by a sea. The *Vancouver* of the Dominion Line—long the favourite ship of that Company—had her chart house, with the master and man at the wheel carried overboard bodily. The *Servia* had her funnels flattened and serious deck damage—davits as thick as a man's thigh being twisted like corkscrews. The *Umbria* had her adventure of the same kind and even the new Cunarders—probably the most seaworthy vessels that ever left a British port—have had their experiences in which one of them had a great anchor carried aft, doing damage as it went. Elsewhere we are able to give some illustrations and particulars of the condition of the *Narrung*.

The "Snowdon Range."

Certainly the most noteworthy story is that of the *Snowdon Range*, the Furness liner which has achieved a record, inasmuch as she was fifty-three days crossing the Atlantic, and yet came safely to port. Leaving Philadelphia as long ago as the 23rd November, with a general cargo, which included grain, flour and treacle, she got on to the re-insurance market by the middle of December and by the 16th of that month was at the high rate of 85 guineas. Then came news that she had been spoken by the steamship *Caledonian* in lat. 43 N., long. 57 W., on the 28th November. But as she would then have only been five days out on her voyage to Leith, the report did not amount to much one way or the other. So she became quite uninsurable and so continued till about the 10th of January, when it became known that she had been sighted still afloat by the Danish steamship *Versterland* on the 19th December. She was reported as being then in a pitiable condition. Her rudder had been lost fourteen days previously and she had been rolling helplessly and heavily ever since. The Dane refused to attempt to tow her, and her crew declined to abandon her by accepting the only offer the foreign captain would make, *viz.*, to take them off the disabled

ship. So he sailed away and underwriters thought there was little prospect of her ever being heard of again. It was a welcome surprise indeed, therefore, when Skibbereen telegraphed on the morning of the 13th January that the *Snowdon Range* in tow of the Dominion liner *Welshman* was then passing the Fastnet. The *Welshman's* task had been a serious one but it now seemed over when the salvor and her tow were close in off the coast. The measure of this salvage service may indeed be gathered from the fact that the disabled ship was sighted by the Dominion liner on the 1st January; that the towage only extended a distance of 500 miles, and yet it was not till the 13th January that it was accomplished, and the Queenstown tugs came up to give their assistance.

But even then the *Snowdon Range's* troubles were by no means at an end. When she was so near safety as Daunt's Rock a sudden gale sprang up, and not only the tugs, but even the faithful *Welshman*, had to leave her and make for harbour. Captain Dickinson dropped both the *Snowdon Range's* anchors and hoped that she would be able to lie there and ride out the storm. This hope, however, was soon shown to be illusory, for the ship began to drag. Fortunately those in charge of the search light at the west fort at the entrance to Queenstown harbour realized that they could help by turning the light on to the ship and the coast. Thus the master, by the aid of the engines, was able to manœuvre his ship a little, and getting into a position off the entrance, the disabled ship was carried by the sea right into the harbour and landed on a bank of mud, after touching bottom under Camden Fort. Eventually on the 15th January she was towed into the Inner Harbour. Twenty-five tons of grain had been used in the ship's furnaces, but otherwise the valuable cargo she carried seems to have been undamaged, and the injuries to the vessel herself are by no means serious. No one on board seems to have been injured throughout, though all hands were naturally exhausted by their long and trying experience. Recognition of the feat which the master and crew of this vessel have performed seems to be allowed them in many quarters, and it is pleasant to learn that as far as possible Messrs. Furness, Withy & Co. intend to keep the crew together.

THE LOSS OF THE "VERONESE,"

a fine seven-thousand ton steamship of the Lamport & Holt Line, which had only recently undergone extensive alterations and additions to the passenger accommodation by Messrs. Workman, Clark & Co., Ltd., seems to be the most serious disaster recently recorded. Leaving Liverpool for Brazil and the River Plate with a general cargo of over 5,000 tons and some eighty crew and about twenty passengers, she called at Vigo, where 119 more passengers—mostly steerage—were taken on board. This was early on the 10th January, and later on the same day the ill-fated vessel struck the rocks some three hundred yards from the shore at a place two miles north of Leixoes Roads. The violence of the sea was such that no assistance could at that time be rendered either by other steamships, which were in the neighbourhood, or by lifeboats. So the rocket apparatus was the only resource, and there were great difficulties in establishing communication. When at last a line was got fast the seas were so heavy that it was at first impossible to use the breeches buoy. Then when between thirty and forty persons, mostly women and children, had been transferred to the shore the ropes were carried away and a considerable time was taken up in restoring communication. Work proceeded slowly, as was only to be expected under the difficulties of the case. But on the morning of Saturday, the 18th January, the sea went down sufficiently to enable two tugs and the lifeboat to leave the harbour and the work of rescue was thereby much accelerated. The lifeboat now took the people off the wreck, transferring them to the tugs and returning for fresh consignments till all the survivors were removed. The loss of life seems, as yet, uncertain. It has been put as high as 43 and as low as 15. Some of these persons were lost by exposure, some by being swept from the vessel's decks and some through accidents in connection with the use of the breeches buoy. The ship, which was built as recently as the year 1906, by Messrs. Workman, Clark & Co., Ltd., Belfast, is a hopeless wreck.

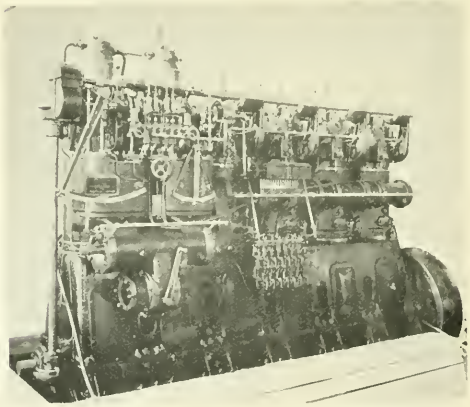
"IMPERATOR'S" ANCHORS.—Five anchors have been ordered in England for the *Imperator*. The first which has arrived at Hamburg weighs 13 tons.

MOTOR VESSEL "CALGARY."

THE motor cargo vessel *Calgary*, which successfully crossed the Atlantic some little time back, was been built by Messrs. Swan, Hunter & Wigham Richardson, Ltd., for service on the Canadian lakes. She is a vessel of the same type, but with engines of greater power, as the *Toiler*, the first oil-engine vessel to cross the Atlantic, and built by the same firm. The main engines, which are illustrated, were built by the Aktiebolaget Diesels Motorer, of Stockholm, and were fitted on board by Messrs. Swan, Hunter & Wigham Richardson, Ltd., and consist of two Marine-Polar Diesel engines, driving twin screws. The engines are of the reversible two-cycle type, with four working and two scavenging cylinders, and develop a combined B.H.P. of 520, which is equal to about 600 I.H.P.

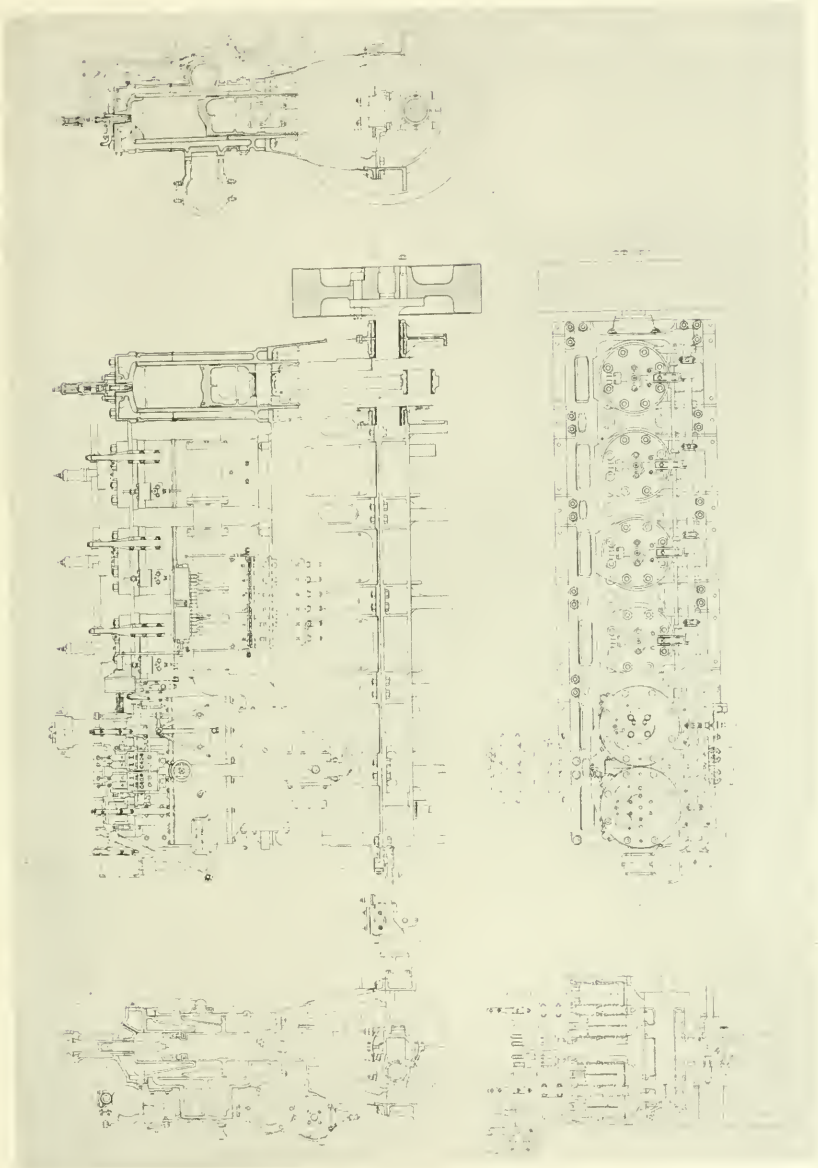
There are in addition the necessary accessories, tanks for storing injection and starting air, oil heater, filter, auxiliary compressor, etc. The auxiliary machinery on board is driven by steam supplied by two Cochran donkey boilers, working at 100 lbs. pressure, and fitted for burning oil fuel. These boilers are also utilized for heating the vessel by steam.

Since 1907 Marine-Polar Motors have been installed in a number of vessels, including motor boats, tugs, whalers and cargo vessels. The Norwegian polar ship *Fram*, so well known in connection with Nansen's tedious Polar expedition, when refitted for a similar expedition under Capt. Amundsen, was provided with a Marine-Polar engine of 180 E.H.P., with 280 R.P.M., replacing the steam engine before used. The Aktiebolaget Diesels Motorer have a large number of motors in course of erection.



One of the *Calgary's* Marine Polar Motors, 260 B.H.P.

THE BODDY LIFE-SAVING JACKET. We understand that the "Boddy" life-saving jacket is being taken over by a syndicate and that shortly a Company will be floated to work the jacket, which has been prominently before the public for some time. The "Boddy" life-saving jacket has been approved and certified by the Board of Trade as a life-saving appliance, and it is to be assumed that it will have a large sale to the shipping companies.



Marine-Polar-Diesel Motor, built by Aktiebolaget Diesels Motorer, of Stockholm. Reproduction of general drawing of one of the Engines fitted in the *Calgary*. Two engines have been installed of 260 B.H.P. each. The vessel is in length 75·64 m.; breadth, 12·96 m.; draught, 4·27 m.; and has a loaded speed of 8 knots.

THE CUNARD LINER "AQUITANIA."

WHILE the accurate general dimensions—not to speak of the details of construction and arrangement—of the Cunard Liner, *Aquitania*, which has now assumed concrete and symmetrical form on the stocks of the Clydebank Yard of Messrs. John Brown & Company, Ltd., are still unknown to the public, as well, indeed, as to those who might be thought to have the privilege of a "peep behind the scenes," it is beyond doubt that in size the new liner will considerably exceed the dimensions of the *Lusitania* and *Mauretania*. No authoritative information has been permitted to get into currency on the matter by the owners; but it is openly surmised, and tacitly acknowledged, that as regards dimensions, general arrangement, and propulsive efficiency, if not of absolute speed, the new vessel is intended to be a response to the challenge made by Germany in her production of the Hamburg-American liner, *Imperator*, which was launched from the Vulcan Yard, Hamburg, on May 23rd last, and is now approaching measurable distance of completion. When that great vessel is put into service, and her size and powers are matter of common knowledge, doubtless all uncertainty as to the size and character of the *Aquitania* will have been removed. The official particulars of the *Imperator* as to dimensions and tonnage have been given as:—Length 881 ft., beam 96 ft., and tonnage 50,000 tons gross, although other apparently authoritative enough statements give 98 ft. as the beam, the depth 62 ft., and the length 919 ft.—probably the length over all. The tonnage of the *Aquitania* is commonly referred to as being of the same as that above given, but if as is believed the Cunarder is somewhere in the neighbourhood of 900 feet in length on the loadline, the advantage will lie with her as regards tonnage at least.

The *Aquitania* is being constructed on the same portion of the Clydebank Yard as that from which the *Lusitania* was launched; but it was found necessary to considerably lengthen the berth and alter its angle to the river, principally to secure a better launching run. To effectively deal with the work of construction the builders also installed a very complete arrangement of electric jib cranes having lattice girder standards; and of a type already approved in the work of constructing previous vessels; ranged alongside each side of the berth for its whole length. The initial stage of construction, that of laying the keel blocks supporting the flat keel plate and centre longitudinal, was begun in March, 1911, and work steadily proceeded in the erection of double bottom floors and longitudinals.

In all structural essentials the great vessel has now assumed something like final form; in fact, her launch is provisionally fixed for about the 22nd or 23rd April, and while no information as to structural detail or scantlings is available, it goes almost without saying that every care and skilful attention has been given to the vital question of watertight subdivision and life-saving appliances. In addition to numerous strong transverse water-tight bulkheads extending well above the load water line, the hull is subdivided by longitudinal water-tight bulkheads arranged in a similar manner to the like features in the hulls of the *Lusitania* and *Mauretania*. The later vessel has also a water-tight lower deck, extending throughout her whole length. The total number of persons she will be capable of carrying is approaching 4,500, and the provision to be made in the way of lifeboat accommodation—taking the form of ordinary lifeboats, motor-boats, and decked lifeboats with collapsible sides—will be ample for all on board.

As regards propulsive power the machinery will consist of Parsons' turbines, driving four screws. The turbines will be arranged in series upon the same system as that adopted in the case of the recently completed French liner, *France*, and which is also being adopted in the case of the *Imperator* and the other two large vessels now building for the Hamburg-American Line. Steam will be provided by cylindrical Scotch boilers working under forced draught. The vessel is not intended to eclipse or even rival the speed attained by the 25½-knot *Lusitania* and *Mauretania*, the hull and propulsive agent being designed for a speed of 23 knots.

The after portion of the hull, corresponding to the "deadwood" is cut away in the same manner as in the *Mauretania* and *Lusitania*. The stern frame, rudder and propeller brackets, which are of massive construction and of cast steel were supplied by the Darlington Forge Coy., Ltd., of Darlington—which firm, it will be remembered, was responsible for the like features not only of the *Lusitania* and *Mauretania*, but also of the White Star liners, *Olympic* and *Titanic*. The stern frame and propeller brackets are cast of Siemens Martin mild steel of special quality. The rudder is of solid cast steel built in three sections; the rudder head, however—the outside diameter of which is 25 ins.—being of forged ingot steel of the quality used for gun jackets. The weight of the stern frame and brackets is 130 tons, of which 50 tons is represented by the main piece of the stern frame—which was cast in one piece—33 tons by the after brackets, and 35 tons by the forward brackets. The forward brackets have centres of shafts 57 ft. apart, and diameter of bosses 4 ft. 3 ins., whilst the after brackets have centres of shafts 20 ft. apart, and diameter of bosses 4 ft. 3 ins. The distance between the forward and the aft brackets is 86 ft.

Much of the work connected with consigning her to the water—a weight of at least 27,000 tons—has been prepared. The standing ways are almost wholly laid and the sliding ways are being put in place. Apart from the openings which have been left for the admission of workmen and materials, the hull is completely plated. After the launch about one year will be occupied in completing the vessel and she should be ready for trials by the second month of 1914, in this way being turned out well within the period of two years. She will, for a time at any rate, be the largest vessel sailing under the British flag, although she will ultimately be deprived of this distinction by the White Star Liner, *Britannic*, now on the stocks at Belfast

THE FIRST MARINE ENGINEER CERTIFICATES.

WE have pleasure in reproducing, by the courtesy of Mr. Peter Denny, Dumbarton, a photograph of the first certificate granted by the British Board of Trade to a marine engineer, and alongside of it the first certificate granted by the New Zealand Government to a marine engineer; in both cases these were first-class certificates. The photograph is to be presented to the Institute of Marine Engineers by Mr. Denny, and will prove an interesting addition to the collection of exhibits already in the premises of the Institute.

The British certificate was granted to Mr. John Isbister, who died a few years ago in Kaipara, New Zealand, after having lived in retirement from active duty for several years. He served on the Australian coast steamers from about forty to fifty years ago, when marine engines were very different from what they are now; still they were the pioneers of the luxuriously appointed vessels of which the *Indarra*, recently built by Messrs Denny, is a type. Mr. Isbister's daughter in New Zealand is in possession of the original certificate and lent it to Mr. J. D. Stuart, who had it photographed for the Australasian Institute of Marine Engineers, of which Mr. Stuart is one of the founders. The New Zealand certificate was granted to Mr. James Jobson, who, having retired from sea voyaging, now resides at Auckland, New Zealand. It is interesting to note that Mr. Jobson was chief engineer of the S.S. *Phoebe*, built in 1851 by Alex. Denny, Dumbarton—Number 5—and engined by Messrs. Tulloch & Denny—Number 1—. During later years she voyaged as a collier, with the original engines at work, until not many years ago, when she rested from her labours and became a coal hulk at Sydney, New South Wales.

FIRST CLASS

ENGINEER'S CERTIFICATE OF SERVICE.

ISSUED BY THE BOARD OF TRADE Under the Provisions of the Merchant Shipping Acts Amendment Act, 1862

No. in Figures.	No. in Words.
1	One

Name John Isbister

Born at North Shields | Employed Seven years

County Northumberland | in Coasting & Foreign Trade

Year 1828 | as an Engineer.

Bearer's Signature John Isbister

Granted by the REGISTRAR GENERAL OF SEAMEN, London.

By order of the BOARD OF TRADE,

J. Thomson

Registrar General.

Issued at London

this 5th day of Decr 1862

J. O. P. Stuart,

*** Any person forging, altering, or fraudulently using this Certificate, or allowing the same to be used, will be subject to a Penalty of One Hundred Pounds or Six Months Imprisonment with or without Hard Labour. Any person becoming possessed of this Certificate other than the person to whom it belongs is required to transmit it to the Registrar General of Seamen, Adelaide Place, London Bridge.

NEW ZEALAND

Certificate of Competency

as

FIRST CLASS ENGINEER

To William James Jobson

Whereas it has been reported to me that you have undergone such examination as is required by the Regulations made under the Merchant Shipping Act, 1894, and have been found duly qualified to fulfil the duties of FIRST CLASS ENGINEER in the Merchant Service: I do hereby in pursuance of the Merchant Shipping Act, 1894, and the Regulations made thereunder, grant you this Certificate of Competency.

Given under the Seal of the Marine Department of New Zealand at Wellington this Sixteenth day of December 1872

William Reid

Registered Lewis H. D. Wilson

NEW ZEALAND.

No. of Certificate 1

Address of Bearer S. S. Phebe, Wellington.

Date and Place of Birth 28th August 1833, Newcastle on Tyne England

Signature [illegible]

This Certificate is given upon an Ordinary Examination passed at Wellington N.Z. on the eighth day of June 1872

Every person who makes, or assumes to be made, or assists in making any false representation for the purpose of obtaining for himself or for any other person a Certificate either of Competency or Service, or who forges, assists in forging or procures to be forged, or fraudulently alters or assists in fraudulently altering, or procures to be fraudulently altered, any such Certificate, or any Official Copy of any such Certificate, or who fraudulently makes use of any such Certificate or any copy of any such Certificate, which is forged, altered, cancelled, suspended, or to which he is not justly entitled, or who fraudulently lends his Certificate to or allows the same to be used by any other person, shall for each such offence be deemed guilty of a misdemeanour, and may be summarily punished by imprisonment, with or without hard labour, for a period not exceeding six months, or by a penalty not exceeding £100; and any Engineer who fails to deliver up a certificate which has been cancelled or suspended is liable to a penalty not exceeding £50

Issued at the PORT of Wellington on the Sixteenth day of December 1872

J. Mackay Mn Cy

MARINE ENGINEER CERTIFICATES.

The first Certificate granted by the British Board of Trade.

The first Certificate granted by the New Zealand Government

FOREIGN NOTES.

France.

THE French shipyards are well employed and orders have been received by The Chantiers de la Loire for a cargo steamer to be named *Champlain*, to the order of the Chargeurs Réunis. Her length will be 132m., beam 16·4, and on a draught of 8m. the vessel will carry 8,650 tons. The *Champlain* will be launched in June This shipyard has further orders for two cargo steamers, *Marie Louise* and *Henriette*, to the order of the Navigation de Paris. The Chantiers de Provence are just now building a mail steamer *Ile de Cuba*, for the account of the Compagnie Générale Transatlantique The *René Caillé* has just been launched at the Chantier Desbats at Bordeaux and is intended for use on the river Niger. She is built entirely of steel and is fitted with an oil motor of 50 h.p. The Ateliers et Chantiers de France have built and launched the steamer *Saint Barnabé*, constructed for the Société Navale de l'Ouest at Havre. The Chantiers de Normandie have just launched the cargo steamer *Mississippi*, built to the order of the Campagnie Générale Transatlantique. The *Antilles*, built to the order of the same Company has also just been launched at the Chantiers de l'Atlantique. She is to be employed for the Colonial service.

Holland.

It is reported that a commission of Dutch naval officers are at present in England to negotiate the building of four battleships of 17,000 tons displacement. The construction of these ships has been definitely decided on and the commission has to settle the details of same.

Germany.

The Shichau shipyard at Elbing has received an order from the Russian Government for two cruisers of 4,300 tons to be delivered by the 15th July, 1914. The engines are to be of the turbine type on the Schichau system, and the vessels are to have a speed of 27½ knots. The price of each is stated to be 3,500,000 roubles.

The twin-screw passenger and cargo steamer *Sierra Ventana*, of 8,800 tons, built to the order of the Hamburg-America Line, has just been launched at the yard of the Bremen Vulkan. Every comfort has been provided for the passengers and their safety has been considered by supplying the *Sierra Ventana* with boat accommodation for every one on board. The boats are swung out by Welin davits. Two triple-expansion engines developing 4,200 i.h.p. prope the vessel at a speed of 13½ knots.

The Reiherstig shipyard at Hamburg has just launched the twin-screw cargo and passenger steamer *Bahia Castillo*, built to the order of the Hamburg South American Steamship Company. Her length is 155m., beam 18·6m., and her carrying capacity 12,000 tons. Two triple-expansion engines of 4,300 i.h.p. will propel the vessel at a speed of 12½ knots.

At the Neptune shipyard at Rostock the cargo steamer *Odessa* has been launched. She has been built to the order of the German Levant Line at Hamburg and has a carrying capacity of 6,500 tons. The engine will develop 1,600 i.h.p., and will propel the steamer at a speed of 10·5 knots. The *Brund Brook* has been sold to a shipping firm in Italy. Her carrying capacity is 1,515 tons. The steamer *Marie Menzell*, of the Menzell Line, at Hamburg, built in 1904, at Flensburg, with a deadweight capacity of 3,700 tons, has been sold to a shipping firm in Holland.

The steamer *Gadhilde*, of 3,556 tons, built at Sunderland in 1894, has been sold by the F. R. Tetzlaff Co., Hamburg shippers, to a shipping company in Italy.

The Flensburg shipyard has launched the cargo steamer *Stolberg*, of 9,500 tons, built to the order of the German Australian Steamship Company of Hamburg. The twin-screw cargo and passenger steamer *Sierra Salvada*, built to the order of the Norddeutsche Lloyd of Bremen, has been launched at the Bremen Vulkan at Vegesack. She is of 8,800 tons, length 139·6m., beam 17m. She will be equipped with two triple-expansion engines of 4,200 i.h.p., and her speed will be 13½ knots. The *Sierra Salvada* will be employed on the La Plata Line. Six other steamers, each 11,000 tons, are in course of construction for the same Company at this yard.

At the Germania shipyard at Kiel the tank vessel *Hagen* has been launched Her length is 121m., beam 16·15m. and at 7·7m. draught she can carry 7,770 tons of oil, the contract horse-power is 2,300 and the speed 10·5 knots. Two single-acting, six-cylinder reversible Diesel motors, developing 1,150 h.p., have been installed

The Bremen Vulkan shipyard at Vegesack has just launched the *Rappenfels*, built to the order of the Hansa German Steamship Company at Bremen. The *Rappenfels* has a carrying capacity of 9,000 tons and is equipped with all modern improvements for service in the Tropics. A triple-expansion engine, developing 3,000 i.h.p., will give the vessel a speed of 12 knots. The steamer *Castell Pelesch*, of 6,500 tons, has just been built to the order of the German Levant Line at Hamburg. She is 115m. long, beam 15·5m. and her engines will develop 1,600 h.p., giving her a speed of 10 knots. The *Lüneburg*, a steamer of 9,600 tons, built at the Tecklenborg shipyard, at Bremerhaven-Geestemünde, for the German Australian Steamship Company, has just gone through her trial run from Bremen to Hamburg. The engine developed 3,000 i.h.p. and gave the *Lüneberg* a speed of 14½ knots.

The shipyard von Nusske & Co. at Stettin has received an order from the North German Lloyd office in Paris for a saloon passenger paddle steamer to serve as a tender to the ocean liners of that Company, which call at Cherbourg. The vessel will be fitted up with the most elaborate equipment for passengers and her length will be 61m. and greatest breadth 13·4m. Two horizontal compound engines, which can work independently of each other, totalling 700 h.p., will impart a speed of 12 knots to the vessel.

At the yard of the Weser Ltd., at Bremen, there was recently launched the cargo steamer *Huberfels*, of 9,000 tons, built there to the order of the Hansa German Steamship Company at Bremen. Her length is 128m., and beam 17m. She will be fitted with a quadruple-expansion engine of 2,500 h.p., which will give her a speed of 11½ knots. The same shipyard has six further cargo steamers in course of construction for the Hansa Steamship Company at Bremen.

Russia.

The shipbuilding firm F. Shichau, at Elbing, has purchased a large tract of land at Riga and will at once lay down the plant of a large shipyard for the construction of the warships, which have been ordered by the Russian Government.

Siam.

It is reported that Siam is intending to establish a fleet and plans are being prepared for warships of various classes.

Italy.

The Italian Admiralty is preparing plans for the construction of four further armoured cruisers. The Marine Budget for 1914 will include a demand for the necessary funds for the execution of this extension of the fleet.

Austria.

The construction of a large number of submarines of 550 tons displacement is being planned. As the Whitehead Yard has increased the price for these boats very considerably it is very probable that orders for these submarines will be placed with foreign shipbuilders.

BOARD OF TRADE REGULATIONS.

IN view of the new Board of Trade Regulations which come into force in 1915, it behoves the Principals of the schools and colleges where marine engineering students do congregate, to make preparation for extended courses to meet the demand of the coming requirements. Many senior engineers do not look favourably upon the clauses granting theoretical study or class attendance as an alternative for any third part of the 18 months' sea service, on the ground that the greatly added responsibilities in connection with machinery fitted in the modern steamship, with the consequent

accumulation of work, demand all the extra 6 months' experience. We incline to agree with this view when it is considered that the propelling machinery exacts so much careful attention in the interests of economy and efficiency, while the multiplication of auxiliary machinery in passenger steamers has greatly added to the duties and responsibilities of the engineers. The necessity for an extended experience of practical work has been recognised in the new regulations and the change has been generally approved, but some of our subscribers have pointed out that they have had juniors who could talk freely—mayhap learnedly—about the products of combustion, but were unable to direct the work in the stokehold, or who could speak with aplomb of ratios and friction losses, but were unable to stand the test of handling a chipping hammer and file to adjust a set of brasses, or, to dress a chisel; it ought,

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therefore, to be emphasized that the practical work is the main thing to be kept well forward by those who advise candidates in respect to their qualifications. No doubt, experience is the best teacher and should be rated accordingly; at the same time, it may be conceded that an engineer who can not only do the practical work, but understand the reasons of things which come under his observation, is all the better for his knowledge, yet the parade of theory is not profitable in the face of that knowledge which is built up from experience.

The clause conveying the alternative of class study to sea experience is meant, it is apprehended, to involve tangible and close attendance at an approved school or college for the stipulated period and not merely a perfunctory or nominal attendance for a few weeks, but it would be well to have this expressly stipulated, so that there may be no false

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impression or dubiety on the question. Bearing in mind that the importance of the essentially practical bearing of an engineer's duties must be inculcated along with theoretical study, the primary qualifications of the preceptor and guide must be that he has had an extended experience in the engine room, and has in addition the scholastic knowledge and facilities to demonstrate, by object lessons, the why and wherefore of essential points, and means at hand of showing to the student the best way to the true path of progress. Among the schools which have been preparing for the alternative clause requirements is the City Marine Engineering Academy—an interesting souvenir of which has just reached us, and from this a few illustrations are reproduced to indicate the enterprise and painstaking on the part of teachers to convey to their students, not only information, but the results of research and experiments as object lessons to guide them in their daily duties. The Principal is a marine engineer of experience, having an extra first-class Board of Trade certificate, he is also a keen student of all subjects connected with engineering practice, and author of several booklets and papers of value to engineering students, including the *rationale* of wireless telegraphy with demonstrations.

MARINE MOTOR NOTES.

SATISFACTORY reports continue to be received from several of the motor vessels now in regular commission, and while there are cases indicating that overhauls and renewals have been greater than might be expected, such have been abnormal in comparison with the average experience, so far as can be gathered and allowing for the usual reticence of engineers in charge who, with regard to their own vessel, set forth the good qualities and express surprise that there should be any question of the reverse, save when confidential discussions arise as to modifications and improvements and the engineering instinct is aroused. The gas-engined yacht *Y Ddraig Goch* for Mr. G. H. Williams, and termed in Sassenach the *Red Dragon*, had a somewhat rough experience on her way from the Clyde to Wales and had to take refuge in Belfast Lough, where she lay off Carrickfergus on Christmas Day, a.id described by one of our subscribers there, as hardly dealt with by the gale. She is about 1,200 tons and her engines develop about 240 H.P., and being of a type which is a departure from the normal, it is of very great interest to watch her further progress and express the hope that the results will prove favourable and up to expectations on the part of the owner. The Scottish Motor Ship Co., Glasgow, has still other vessels to follow those already at work. It is satisfactory to note that the damage done to one on the West Coast during a gale has been overhauled by the builders at Alloa, and she is ready for service again. The *Innislargis*, built by Messrs. Cran & Co., Leith, and fitted with Beardmore engines of 130 B.H.P., has run satisfactory trials. The illustrations given of this firm's engines show the type fitted in coasting vessels and also the appearance of the class of vessel in which these engines have been fitted. According to the report of the Royal National Lifeboat Institution, there were three motor-propelled lifeboats added to the coast service last year. The Pilot Service has also recently added new motor-propelled cutters to their fleet of boats. Circumstances arise frequently when an auxiliary motor is invaluable for vessels which can also take advantage of sails and a favouring breeze. The heavy weather experienced in the Atlantic during the past month has been very severe on all vessels and many disasters have resulted; some of those which have weathered the gale have arrived with bunkers nearly bare and suffering from coal fever, a type of malady met with occasionally, due to a spell of adverse weather.

It is very good news that the *Earlshall* auxiliary motor-powered sailing vessel has weathered the gales in safety, although compelled to give up the projected voyage to Newfoundland, whither she was outward bound. She is described from Queenstown as severely damaged about the deck, and with broken masts and sails, after buffeting about the seas for thirty days. The motor vessel *Eavestone* is reported to have experienced on her outward voyage some damage to her machinery, on account of cracks developing in the region of the cylinders. Such experience indicates the necessity for high test metal, and along with this the exercise of great care in the working of the small details which may mar the whole engine by abnormal and sudden changes of temperature. Similar experiences occur in connection with steam, and in respect to both engines and boilers, especially the latter, when cold air is allowed to reach the back ends or, as has recently happened, when abnormal heat, due to shortage of water, comes upon the firebox crown and buckles the top plate, damages the tube plate and collapses some of the tubes. It may be added *apropos* of this that repairs in such a case are now effected by means of the electric welding plant, so that it is not necessary to cut out any of the tubes to provide a lap joint for a new portion of the tube plate, the new portion is butted on the original undamaged plate and welded across, the crown plate being renewed if the buckling is beyond resetting. With regard to motors, the amount of spare gear necessary to be carried at present to ensure the full power units may be reduced when experience has shown to all makers what is required.

THE ENGINEER OF THE STEAMBOAT "COMET."

TO mark the part taken by John Robertson, the maker of the engine fitted in Henry Bell's steamboat *Comet* in the inauguration of steam navigation, a memorial obelisk, with suitable inscription, subscribed for by people of the neighbourhood as well as by many connected with the engineering, shipbuilding and shipping industries of the Clyde, was unveiled at his native village of Neilston, on August 24th last, and now a further memorial is about to be erected over his grave in the Southern Necropolis, Glasgow, which up till now has been undistinguished by any headstone. This is the result of a movement instituted by members of the Institution of Engineers and Shipbuilders in Scotland last year, and through sums mainly subscribed by its members has now been brought to fruition. The memorial takes the form of a granite slab, bearing on its surface, and inlaid, a fine medallion head of Robertson, cast in bronze, together with an inscription as follows:—"This monument was erected, 1912, by the members of the Institution of Engineers and Shipbuilders in Scotland to the memory of John Robertson, engineer. Born 10th November, 1782. Died 19th November, 1868. Maker of the engine of the *Comet*, 1812, the first steamboat that plied regularly in Europe."

MESSRS. H. E. MOSS & CO. Mr. Edwd. C. Cohan (principal of this firm) has admitted into partnership his two sons, Mr. W. Molyneux Cohan and Mr. H. Molyneux Cohan, and also Mr. C. J. Byrne and Mr. H. Jackson; the two last-named gentlemen have been members of the staff for many years. Messrs. H. E. Moss & Co.'s steamship circular states that the past year has been a particularly good one for steamship owners. Trade at home and abroad is very good. The new tonnage built has all been quickly absorbed, and for some time to come that under construction, they anticipate, will be similarly absorbed. Builders are full of orders, and many well into 1914, and prices have continued to advance. Steamers of 7,500 tons deadweight, costing £38,000 to £40,000 two years ago, now cost £56,000, and the prices for second-hand tonnage has increased proportionately. The principal feature of the past year has been the realization of the great demand for oil fuel.

REVIEWS.

Toothed Gearing. By Geo. F. White, B.Sc. London: Scott, Greenwood & Son. 1912. Price 3/6.

It is well known that with the new forms of motion introduced of recent years there has been a much increased use of gearings, and these of a very complicated nature, as for example, in a motor car, and it is therefore not to be wondered that gearing becomes in a measure almost a science of its own. In the little book before us, with its descriptive matter and illustrations, we have practically perfection in this department. The subject is traced from the shape of teeth and how formed through the different kinds of wheels, so that the reader has before him in the clearest possible way the various gearings meshing together. He has the usual examples in practice and finds that it is possible to drive a wheel with special shapes of teeth, provided the companion is treated with teeth to correspond. Then there is pin gearing and non-circular wheels. We afterwards come to helical gearing, with that important branch of bevel wheels — the skew shape. Worm gearing is an important branch thoroughly discussed here, of which a variation is the screw or spiral form, in which either member may be the driver. The strength of teeth has a chapter to itself, in which spreading is mentioned as rendering support. Finally, we have names of wheels and practical methods of setting out teeth of wheels. An index follows. In conclusion, we consider this handbook will make a place for itself, and for teachers should prove an invaluable aid, while designers in difficulties will be likely to find a way out of any impasse in this branch.

The Practical Mechanics' Handbook.—By Franklin E. Smith. London. Constable & Co., 1912. Price 4/6.

The author says his object in writing this book is to give mechanics who have not had an education in earlier days assistance by a simple course of instruction, so that they may be able eventually to cope with a more advanced range of study. With this object in view he divides his subject into six parts, commencing with arithmetic and simple numbers and finishing with strength and stress of materials. It is just possible that by a simple exposition such as this is, considerable aid may be afforded to a student if he is diligent enough to follow word by word what he finds here. The science of numbers is, for example, so clearly explained that given the application we should certainly say the book may be classed as a reliable self-educator, if such a term is possible. The student is led gradually from figures to measurements and weights. The second part on arithmetical signs may be said to be algebra simplified, and should prove very useful, while with the mensuration problems we find good diagrams in illustration. This last is followed on by mechanical power from the lever to the screw, all treated in the same manner and with examples at each step. Students who have received a fair education will probably find something new in the ground work of engineering science these pages certainly show themselves to be. The last part on strength and stress of materials is, like the others, fully explanatory both by word and sketch, and we consider the author's claims which he sets out with are very fairly met. He keeps throughout in the same simple form, almost as if it were a child being instructed, and for the purpose he has in view this is of very considerable advantage.

Ainsley's Engineers' Manual of the Local Marine Board Examinations. Price 10s. nett. 26th edition.

This well-known publication has reached twenty-six editions, the last being published recently, and in view of this no further evidence is required as to the value of the book as an instructive medium for engineers. The present edition, which contains a wealth of information, has over 700 pages and upwards of one hundred and fifty illustrations, and has been carefully revised by Mr. Tom Wake, extra first-class engineer, etc., of West Hartlepool. The work is intended for the use of engineers desirous of obtaining certificates as second or first-class engineers, and is specially drawn up with a view to self-instruction as well as for the use of schools. The volume includes rules for working out the several problems put before candidates for certificates, with model solutions of and numerous exercises to each problem, and a number of examination papers are also given. The drawing book which accompanies the manual has been thoroughly reconstructed, the drawings being superior to the old ones in size and detail, nineteen of the drawings have actually been given in examination recently. A supplement of 24 pages is issued with the manual, which contains forty-six questions for second class and thirty seven questions for first-class engineers, these questions are the latest given at the Board of Trade examinations and consequently bring the work right up-to-date. The work is published by Mr. T. L. Ainsley, Mill Dam, South Shields, and other firms associated with it are Messrs. Simpkin Marshall, Hamilton & Kent, Stationers Hall Court, Messrs. Imray, Laurie, Norie & Wilson, 156, Minories, Messrs. Geo. Philip & Sons, 32, Fleet Street, and Messrs. Jas. Munro and Son, Ltd., King Street, Glasgow.

Who's Who for 1913.—London: Messrs. Adam and Charles Black. Price, Cloth 15s. nett, Leather 20s.

The 1913 edition of this work, now in its 65th year of publication, still maintains the high reputation it has established for itself. This year's issue has been considerably enlarged and contains 25,000 biographies, every one being submitted for personal revision, thus ensuring the accuracy which is characteristic of the work. Owing to the stupendous task thus involved no occurrences of a later date than the end of August are recorded in the volume. The biographies are conveniently arranged in alphabetical order and the information which may be gleaned from its pages is of the greatest use both in the office and home, in fact it is essential as a book of reference. The publication is well produced and reflects great credit upon its publishers.

A Manual of Marine Engineering, by A. E. Seaton, M.I.C.E., M.I.M.E., etc. Messrs. Charles Griffin and Company, Ltd., London. Price 28/- net.

This is the 17th edition of the Manual of Marine Engineering which was first published in January, 1883, and which was then considered, and has remained since, a monumental work on the subject, and the numerous re-editions have enabled the work to be kept up-to-date It has been recognised, however, that the processes of original revision of this nature will in time damage the structure of the work, and will tend to make obscure or ambiguous what should be quite clear, and moreover, desirable sequence of statement necessary to avoid mis-conception on the part of the reader is unattainable. The author, therefore, in this edition, had to deal with his task in a much more drastic fashion, than in the former editions owing to the great advance in technical knowledge as well as the important changes that have taken place in the practice of marine engineers, and although much of the original matter holds good to-day, the opinions originally expressed had to be modified, a re-cast of the text has been rendered absolutely necessary, and entirely new chapters had to be written relative to subjects, either untouched upon in the original edition or only slightly alluded to. The production of mild steel to-day compared with that of wrought iron, and the manufacture of steel castings up to 50 tons each at a comparatively low cost has caused great modifications in the design of marine machinery. Other factors which have also had a marked effect include the introduction of high tensile zinc bronzes, the cheap production of aluminium, the casting and forging of alloys, and many similar matters. These new features have enabled matters to be performed to-day on a commercial basis which were practically impossible in former times. The additions made in the subjects of the steam turbine, and of the internal combustion engine for motive power purposes is entirely new matter compared with what was known in 1883, while the auxiliary machinery in the modern ship has now developed into a department of its own which has as much importance as the main propelling engines themselves. The present edition has thus been expanded to nearly a 1000 pages containing 113 chapters and 336 illustrations of machinery.

The Design and Construction of Steam Turbines, by Harold Medway Martin, Wh. Sc., Associate of the City Guilds' Institute, London.—Messrs. Longmans Green & Co., price 25/- net.

This is a very handsome volume in heavy paper of some 372 pages, and containing 523 illustrations on the theory of the steam turbine, and is divided into 30 chapters. The work is substantially a reprint of the articles contributed by the author during the past few

years to the columns of "Engineering." The plan adopted is that of first giving, without prior proof, important rules and formulæ, in a shape convenient for immediate practical application. The demonstrations are proceeded with later, as they will then be more readily followed by the average reader when he has been previously impressed with the utility of the result.

The opening chapters having dealt with preliminary ideas, guide blades, nozzles, the Mollier Diagram, nozzle and guide blade efficiency, impulse buckets, efficiency ratio reheat factor and correction curves, the way has now been cleared for the description of a process by which the general dimensions of any type for any specific output and steam consumption can be got out very simply and easily. The volume forms a very concise and handy record of the theory and practice of the steam turbines, and those who studied the original articles will welcome this form of the work equally as much as those who, for the first time, desire to acquaint themselves with the subject from the standpoint of the author, and will value the book as a useful addition to the scientific library.

Calculations on the Entropy Temperature Chart, by W. J. Crawford, D. Sc., London.—Messrs. Charles Griffin & Company, Ltd., price 2/6 net.

THIS small work of some 71 pages has been written for the use of students who are not very well up in thermodynamics in order to enable them to make intelligent use of the Entropy-Temperature Chart. The idea of the author, which is quite a good one, is based on the contention that because a student is incapable of assimilating the abstract mathematical principles involved in the preparation of the chart, that is no reason why he should not be taught how to use the chart in his ordinary work. To illustrate this view the author gives an interesting simile, in stating that it would be absurd to refuse to teach the use of a spade to a child because he does not understand all the processes of its manufacture. From this point of view the Author has treated the matter as simply as possible, and therefore, a first-class knowledge of the principles underlying entropy is not an indispensable outfit for the purpose. It is, of course, necessary for the student to have one of the charts in his possession in order to work out the examples which are given in the book, and the author recommends for this purpose the excellent chart which is issued by the Board of Education at the small price of one penny. 33 examples are given, and are worked out at length, and comprises both simple and difficult ones, and therefore, students in any particular grade can find useful matter to improve their knowledge on the subject in this work. An appendix is provided, comprising examination questions from the Board of Education Examinations, and also those of the Institution of Civil Engineers.

Vapors for Heat Engines, by William Duane Ennis. Messrs. Constable & Co., Ltd., London; price 6/- net. THIS work commences with a chapter on the general considerations as to the choice of a working fluid and follows on with data for analysis of the subject under review. The limit of efficiency of steam in a working fluid is then dealt with, followed by outlining the line of attack of the subject of the basis of comparative results of various vapors compared with steam. Alcohol, chloroform, acetone, carbon chloride, carbon bisulphide, ether, ammonia and carbon dioxide are dealt with in succession. The work is illustrated by 17 diagrams, and the whole of the matter is presented in a very concentrated form, there being only 78 pages in all.

Brown's Nautical Almanack, 1913.—Messrs. James Brown and Son, Glasgow; price 1/- net. The 1913 edition of this almanack, as usual, is very good value for the money. It is crowded with information, and the publishers have used all means in their power to ensure accuracy. Port charges, lights, beacons and buoys of the United Kingdom, and tidal constants of all ports and harbours take up the major part of the work, but in addition there is much other information all of an interesting character, making the volume an excellent book of reference.

Munro's Marine Engineer's Annual, price 1/- net. Another useful annual, published by the same firm, is this little book, now in its 3rd year of issue. It contains interesting articles, formulæ, rules, miscellaneous tables, and other valuable matter, all for the use of the marine engineer, to whom it should prove of considerable service.

Reeds' Tide Tables, 1913, Messrs. Thomas Reed & Co., Ltd., Sunderland.—This little book is in its 70th year of publication, and contains the times of high water, and depth of water at Sunderland harbour entrance, and the Hendon dock-gates. A general tide table of the United Kingdom and the West Coast of Europe is included, with many other useful and interesting items for the modest sum of 6d.

Ice & Cold Storage Trade Directory, Messrs. Iliffe and Sons, London, price 5/-.—The 1913 edition of this Directory and Handbook makes the 13th year of issue of the publication. The work possesses many useful features, among which may be mentioned a list of vessels fitted with refrigerating machinery, and giving the system of refrigeration employed. In addition it is a very complete directory of the ice making, artificial refrigeration and cold storage industries. Included in the work are some valuable tables on the properties of saturated vapour of ammonia and carbonic anhydride.

Port of Rotterdam—published by the City of Rotterdam authorities, is a short illustrated description of the docks and harbour works of the City. The book is printed in English and beautifully produced. One of its most interesting features is the splendid series of illustrations (photographic reproductions) showing the various classes of vessels frequenting the port, and also views of Rotterdam.

OBITUARY.

Archibald Falconer Donaldson.

WE have to record with regret the death of Mr. Archibald Falconer Donaldson, a director of the firm of Messrs. Barclay, Curle & Co., shipbuilders and engineers, Whiteinch, Glasgow, the event taking place on January 14th, at his residence in Windsor Terrace, Glasgow. He had attended a meeting of the directors of the Company at Whiteinch some five days previously, but contracting a chill, pneumonia developed, and he passed away on the date stated. Deceased, who was only in his thirty-sixth year, was the fourth son of the late Mr. John Donaldson, of Messrs. Donaldson Brothers, Glasgow, the well-kuown firm of shipowners. He served his apprenticeship as an engineer with Messrs. D. & W. Henderson & Co., Glasgow, and joined the firm of Messrs. Barclay, Curle & Co. in 1902. He had charge of the Company's repairing works at Whitefield Road, Govan, for a number of years, and in 1908 he was made a director. He was appointed director-in-charge of all the Company's repairing works, including the graving dock and repairing shops at Elderslie, as well as those at Whitefield Road, Govan.

THE ROYAL MAIL COMPANY'S "DRINA." This large twin-screw steamer, of 11,500 tons gross reg., left Belfast on the 16th January, where she has been built by Messrs. Harland and Wolff, Ltd. She is an exact facsimile of the Company's steamers *Deseado, Demerara, Desna* and *Darro*. She is appointed to take up her position in the R.M.S.P. intermediate service to South America from Southampton, from which port she sailed on the 31st January. A description of the vessel was given in our August issue.

THE INSTITUTE OF MARINE ENGINEERS.—The following is the result of the Competition for the awards offered by the Institute of Marine Engineers to the Junior Section of the Membership:—

Associates: "The Producer gas engine, its principles and its possibilities in connection with Marine work," Wm. Smith, Leytonstone. Graduates: "The Thrust Block—its function, different types and how fitted in the ship," Robert J. Walker, Glasgow. A second award was also given to Harold B. Locke, Upton Manor, Essex.

Open Competition: "Improvements in Workshop Practice in respect to machinery and fitting," Jas. P. Marsden, Yoker, Glasgow.

Industrial and Trade Notes.

THE CLYDE AND SCOTLAND.

(From our Own Correspondent.)

Warships Building on the Clyde.—Of the fifty-seven British warships, representing a displacement tonnage of 224,385 tons, actually under construction in private yards in the United Kingdom for the British Government, more than one-half the tonnage, or twenty-five vessels with a displacement of 118,955 tons, are in Clyde yards. These figures are given in Lloyd's most recent returns and, according to the same authority, no foreign warships are on hand in the Clyde district. The total given includes a battleship on hand by Messrs. William Beardmore & Co., Dalmuir, and another by Messrs. Scott's Shipbuilding & Engineering Co., Greenock; two battle-cruisers by Messrs. John Brown & Co., Clydebank; a protected cruiser by the London & Glasgow Co. (Messrs. Harland & Wolff), Govan; numerous torpedo boat destroyers by various firms, and a submarine vessel by Messrs. Scott's Co., Greenock.

The Fairfield Shipbuilding & Engineering Co., Govan, whose tidal basin is at present fully occupied with notable ships for both naval and mercantile purposes—including the splendid Canadian Pacific vessels, *Empress of Asia* and *Empress of Russia*—have their stocks also well occupied. The most notable item in the way of merchant tonnage on the stocks at present is the new Allan liner *Calgarian*. Like her sister vessel, *Alsatian*, now under way at Messrs. Beardmore & Co.'s, Dalmuir, she is 600 ft. in length, 72 ft. in breadth, 54 ft. in moulded depth, and of 18,500 tons gross. Both vessels will be fitted with turbine machinery of the Parsons' type made by the builders, which will drive four screws and propel the vessels at 19 knots speed. They are intended for service between Liverpool and Quebec and Montreal, and will, in several respects, be the finest vessels engaged in North Atlantic passenger trade. They will each have accommodation for 220 first-class, 500 second-class and 1,000 third-class passengers, and each will have a crew of 470 all told. They are being built with cruiser sterns and will have two funnels. In respect of equipment and furnishing they will mark a departure from conventional lines, especially as regards decoration. In regard to life-saving equipment each vessel will have no fewer than forty-six lifeboats—quite sufficient to accommodate all on board if necessary.

There has recently been delivered at Fairfield, from the Sheffield works of Messrs. Cammell, Laird & Co., the rudder for the *Calgarian*. This is believed to be the largest rudder ever made in two pieces, and their transport from Sheffield to the Fairfield yard was a matter of very special arrangement and considerable difficulty. As delivered the top portion weighed 27 tons and the bottom portion 15 tons. The total height of the rudder, as assembled, from heel to top of stock, is 26 ft. 6 in., the extreme width 21 ft., and the total weight 42 tons. The two portions are joined by a spigot and faucet joint carefully planed and connected by sixty 2¾-in. diameter turned and fitted steel bolts. The body of each portion of the rudder has been cored out, leaving a wall of a minimum thickness of 2 ins. The stock was cast solid and afterwards bored out to ensure perfect soundness and to lessen the weight without impairing the strength. The Fairfield yard, it may be added, has also recently been supplied by Messrs. Cammell, Laird & Co. with two similar rudders, but slightly less in width and weight, for the two new steamers completing for the Canadian Pacific Railway Company.

Clyde and Tyne Combine.—Following the example of several other large shipbuilding firms on the Clyde in cultivating close relations with English concerns, it was announced at the beginning of January that an arrangement had been concluded between Messrs. Barclay, Curle & Co., Ltd., shipbuilders and engineers, Whiteinch, Glasgow, and Messrs. Swan, Hunter & Wigham Richardson, Ltd., shipbuilders and engineers, of Wallsend and Walker-on-Tyne, whereby an exchange of shares was effected and a community of interests insured. The management of the respective companies, however, will remain unchanged. The business of Messrs. Barclay, Curle & Co., Ltd., was established in 1818. Their present premises embrace the Clydeholm shipyard at Whiteinch, with six berths, capable of building ships up to 620 ft. in length; the Stobcross Engine and Boiler Works, Glasgow, and the Clydeside Repairing Works, Govan. Some months ago the firm acquired Messrs. John Shearer & Sons' Eldershe shipyard at Scotstoun, covering an area of 33 acres and including a graving dock 525 ft. long. With this addition the combined works of the firm extend to 60 acres, and will have in all ten building berths with a capacity of 80,000 to 90,000 tons per annum. The Whiteinch yard at present has an annual output of over 40,000 tons, and in 1907 approximated to 50,000 tons. Quite recently the firm built and fitted with machinery of their own construction the Diesel motor vessel *Jutlandia*, the first sea-going motor vessel constructed in the United Kingdom with British-built motors. A round voyage of 24,000 miles has just been concluded and has in every way proved successful. The firm's repair business is the largest on the Clyde, comprising two establishments, and about 750,000 tons of shipping were dealt with in dry docks by this department during 1912. The shipbuilding and engineering works of Messrs. Swan, Hunter and Wigham Richardson, Ltd., on the Tyne, extend over 78 acres, with a river frontage of 4,000 ft. They contain fifteen building berths, the largest being nearly 1,000 ft. long, and four of them are covered by lofty glass-roofed sheds equipped with overhead electric travelling cranes. The building capacity of the yards is equal to about 140,000 tons gross per year, the output in 1911 having been 125,500 tons, and in 1912, 126,150 tons. The Neptune Engine Works of the Company are at present being entirely rebuilt on a new site within the shipyard at Walker and alongside the boiler works. The dry docks department contains two floating docks and a graving dock 550 ft. long, besides extensive machine shops, joiner's and carpenter's shops, and a brass foundry.

Launch of the "Aquitania."—The greatest event of the year now entered upon, so far as Clyde shipbuilding is concerned, will be the launch of the leviathan Cunard liner *Aquitania* from the Clydebank Shipyard of Messrs. John Brown & Co.—in fact, from practically the same berth—"only more so,"—as the *Lusitania* was sent off some years ago. This huge vessel, the progress in whose construction is outlined in a separate article in this issue, is likely to be floated into the waters of the Clyde either on Tuesday, April 22nd, or Wednesday, April 23rd. Nothing is yet known, however, regarding the arrangements for the ceremonial part of the proceedings, or the identity of the lady who will perform the naming ceremony.

Messrs. William Denny & Brothers, Dumbarton, who, amongst other light-draught craft, have at present on hand two barges for river service in India, have placed an order with Messrs. Perman & Co., London, for four 76 H.P. two-cylinder Kromhout paraffin motors to be fitted on board the vessels and drive them through twin-screws.

The Clyde Shipbuilding & Engineering Co., Ltd., Port-Glasgow, have been commissioned by the Lancashire and Yorkshire Railway Company to build and engine two steamers for the Goole and Continental trade, which will be of high speed and of the most modern type.

Messrs. Scott's Shipbuilding and Engineering Co., Greenock, through pressure on their already great working area and facilities, have been compelled to take over a large portion of vacant ground at the James Watt Dock, extending for about 22,000 square yards, belonging to the Greenock Harbour Trust. They have taken it on a ten years' lease, at a rental of £700 per annum. The Trustees have also agreed to a large extension of the shipyard premises of Messrs. George Brown and Co. at a rate corresponding to the present rental.

Clyde Torpedo Factory.—The manufacture of torpedoes at the Clyde Torpedo Factory of the British Admiralty at Greenock has gone on at high pressure during the past twelve months, and there are now over 1,600 workmen engaged in the various departments. Double shifts have been the rule and overtime is not uncommon. Work is carried on under sectional management, each separate part of a torpedo having a building set apart for its manufacture. In this way the policy of maintaining secrecy as far as possible, even amongst the employees, as to the progressive stages of construction is jealously safeguarded. The drafting of skilled labour from Woolwich and other Government arsenals in the South of England is now practically at an end, and there

is, in fact, a fair number of local craftsmen—Scotsmen, of course—employed in most departments of the factory. It appears certain that considerable extension will be made to the works in the near future. By an agreement with the land superior an extensive unoccupied area of ground to the west of the factory is at the option of the Government for a period of years, and amongst the projects in view, it is believed, is a small graving dock or tidal basin. Until recently all the torpedoes manufactured at the factory were, for testing purposes, despatched by rail to the south, but since the opening of the Loch Long testing range, six or eight months ago, they have been conveyed to the Loch Long range by Admiralty steamer.

The Ardrossan Dry Dock & Shipbuilding Co., Ltd., Ardrossan, who have at present on hand a screw steamer of about 850 tons, were commissioned, about the end of the year, by Messrs. James Pollock, Sons & Co., naval architects, London, on behalf of owners abroad, to build two steam tugs. The vessels will be engined by Messrs. Miller & McFie, Glasgow, who have at present on hand seven sets of engines of medium size.

The Dundee Shipbuilding Company, Dundee, have received a contract from the British Admiralty for the construction of a mooring and salvage lighter.

The Caledon Shipbuilding & Engineering Co., Dundee, are well situated at present as regards new work on hand. This includes the following vessels:—The twin-screw Diesel-engined oil-carrying vessels *Sebastian* and *Cassis* for Messrs. Lane & Macandrew, London, and the Anglo-Saxon Petroleum, Co., London, respectively; the large cargo steamer *Norwegian*, for Messrs. F. Leyland & Co., Liverpool, the steamer *Alban* for the Booth Steamship Co., Liverpool, and two 220 ft. passenger steamers for the Trinidad service of the Royal Mail Steam Packet Co.

TYNESIDE AND WEARSIDE.

(*From our Own Correspondent.*)

Tyneside.

THE shipbuilding and marine engineering industries still continue in a prosperous condition on the Tyneside, all the yards and engine shops being very busy, and a very successful year may be looked forward to.

Messrs. Sir Wm. Armstrong, Whitworth & Co,. Ltd., will launch shortly the Brazilian super-"Dreadnought" *Rio de Janeiro*. This is the last but one of the warships to be built at the Elswick yard. The next big warship is to be laid down at the Walker yard, which is nearly completed, and where they can build vessels of the largest size. The *Rio de Janeiro* is the third vessel recently built for the Brazilian Government, she is to be fitted with Parsons' turbines and her horse-power will be 45,000, developing a speed of 22 knots. The firm also have on the stocks a Chilian super-Dreadnought and two cruisers.

Messrs. Swan, Hunter & Wigham Richardson, Ltd., had a very successful year, having the highest individual output of tonnage for the United Kingdom. They have in hand the new oil steamer *San Eduardo*, which they are completing alongside the quay. This vessel is one of four being built by the firm for London owners. The firm has entered into an agreement with Messrs. Barclay, Curle & Co., Ltd., of Whiteinch, Glasgow, an exchange of shares is effected and a community of interests ensured.

Messrs. Palmer's Shipbuilding & Iron Company, Ltd., have a considerable amount of work in hand, all the berths are fully employed and the engine shops very busy. They have also a large amount of repair work on hand, both in the graving dock and alongside quay.

Messrs. Smith's Dock Co., Ltd., are very busy and have a considerable amount of repair work on hand, both in the graving docks and afloat, the recent severe weather being responsible for a lot of it.

Messrs. Joseph Eltringham & Co., continue to be very busy with repair work; they are opening out a new shipyard at Willington Quay, which they expect to have ready shortly.

Messrs. John Readhead & Sons, Ltd., have orders on hand which will keep them fully employed for the rest of this year.

Middle Docks and Engineering Co., Ltd., are very busy and have all the docks full, besides a number of vessels which they are repairing afloat.

Messrs. Wood, Skinner & Co., Ltd., continue to be busy and have all their berths occupied; sufficient orders are in hand to last them well over this year.

Wearside.

Work continues to be very plentiful in all the shipyards and engineering works on the river, and with the recent very severe weather repair work is abundant.

Messrs. W. Doxford & Sons, Ltd., had almost a record year in 1912, and if everything goes well, they certainly will have this year, as they have plenty of orders on their books and all their berths are fully employed.

Messrs. George Clark & Sons, Ltd., continue to be very busy and amongst other work are building a set of engines for a ship building at Messrs. Wood, Skinner & Co., Ltd., of Bill Quay, Newcastle-on-Tyne, and a set for a ship building by Messrs. Osbourne, Graham & Co.

Messrs. Osbourne, Graham & Co. have sufficient work in hand to last them a considerable time; they have just launched another monitor type vessel which they have constructed for Messrs. J. Lund & Co., of Bergen.

Messrs. Wm. Pickersgill & Sons, Ltd., have all their berths fully employed, and with the orders they have in hand look like having a record year.

Messrs. John Dickinson & Sons, Ltd., are very busy, and are working night and day in the shops, and amongst other work are building engines for ships building by Messrs. Bartram & Sons, Messrs. J. L. Thompson & Sons, and Messrs. Wm. Pickersgill & Sons.

The Sunderland Shipbuilding Co. are fully employed and have all their berths occupied.

Messrs. Robert Thompson & Sons are very busy. A vessel building at their yard has just been sold to the Mercantile and Shipping Company, Ltd., Antwerp; she is to be delivered next month.

Messrs. S. P. Austin & Son, Ltd., have a considerable amount of repair work on hand in addition to new work.

The North-Eastern Marine Engineering Co., Ltd., have a large amount of work in hand, and are building engines for ships building on the Wear and also on the Tyne.

THE TEES AND HARTLEPOOLS.

(*From our Own Correspondent.*)

Middlesbrough.

Messrs. Sir Raylton Dixon & Co., Cleveland Dockyard, are very busy and are reported to have sufficient work to last through the year; they are likely to secure the order for a very large steamer that is in the market for foreign account.

Messrs. W. Harkess & Sons are reported to have secured an order for a small coasting steamer. Mr. W. Harkess has been out to Canada with the object of starting a shipyard there, and expects a favourable offer from the Government before commencing operations.

Messrs. Richardsons, Westgarth & Co., Ltd., are very busy in all departments, especially the auxiliary and specialities departments; they are reported to have sufficient work on hand to keep them very busy up to the end of the year.

Messrs. Smith's Dry Dock Co., South Bank, have a very large amount of both old and new work on hand, and it is stated they have to refuse orders on account of delivery, every berth being occupied. Great progress is being made in the extensions to the yard.

Messrs. Rowland & Marwood, Whitby, are reported to have sold the s.s. *Blue Cross*, 3,028 gross tons, and the s.s. *Red Cross*, 2,877 gross tons, and are in the market with enquiries for new boats.

Stockton and Thornaby.

Messrs. Craig, Taylor & Co. are expecting to secure an order for a cargo steamer that is in the market, and have a large amount of work on hand.

Messrs. Richardson, Duck & Co. continue to be very busy, having sufficient work to last through the year; enquiries continue good for better-class boats.

Messrs. R. Ropner & Sons are very busy, having secured several orders recently which will keep them occupied for a long time.

Messrs. Blair & Co. continue to be very busy. They have secured contracts to supply the machinery for several steamers building and to be built on the Tees and Wear.

West Hartlepool.

Messrs. Pyman Bros. are reported as having sold the s.s.'s *Wynford* and *Launa* for about £22,000 each.

Messrs. Furness, Withy & Co. are reported as having sold the s.s. *Saltburn* to Scheepvaart en Agentaur Maatschappij, Rotterdam, and the vessel is to be renamed the *Albergen*. They have also sold the s.s. *Alleghany*, 4,538 gross tons, to the Osaka Shosen Kabushiki Kaisha.

Messrs. W. Gray & Co. continue to be very busy; amongst the recent orders are two large cargo steamers of about 9,750 deadweight, 420 ft. long, 54 ft. 6 in. beam, 36 ft. deep, to do 12 knots, for the Nederland Stoomvart Maatschappij. Messrs. Gray had the ill fortune to have the s.s. *Beeton* run ashore during a dense fog during her trials, when over 100 friends were aboard and had to remain on her overnight until the lifeboats took them off. She is now in dock, and will have to undergo survey as to her damage.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Harbour Dockyard, are still very busy. Amongst the new orders is a small steamer, a repeat of the s.s. *Blackhead* for the Heyn Line, Belfast.

The recent storm has done considerable damage to the main West Pier at the harbour entrance, having carried about 20 feet of the parapet away, whilst several cracks have shown themselves in the main portion.

Hartlepool.

Messrs. The Central Marine Engine Works of Messrs. W. Gray & Co. continue to be exceedingly busy, and greatly hindered by want of material. They have secured the contracts to supply the machinery for the orders previously reported.

Messrs. Richardsons, Westgarth & Co., Ltd., continue to be very busy. Amongst the new work reported is a set of machinery for a large steamer building in the North of Ireland, also a repeat set for the Heyn Line to be built by Messrs Irvine's. Every department may be said to be full of work.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Middleton Yard, continue very busy. They are reported to have secured an order for a large cargo steamer for Liverpool owners; also a second repeat order for the Heyn Line, Belfast.

THE HUMBER AND DISTRICT.

(*From our Own Correspondent.*)

Immingham King's Dock.—The past year has been an eventful one in the history of the Humber, the most notable feature being the opening by His Majesty the King in July of the new Port of Immingham. Although a fair amount of work has been going on ever since, at no time has there been anything like a congestion of business. Regular sailings by the P. & O. Co.'s boats to the Far East and Australia have been inaugurated, the principal goods carried by these steamers being the manufactures of the West Riding and Lancashire. The exportation of coal is the principal business, most of which comes from Nottinghamshire and South Yorkshire. Work on the new granaries is still progressing and the riverside jetties are not yet completed, but the magnificent transport sheds and grain warehouses are ready for use.

Port of Goole. Record Shipment.—The Danish steamer *Queen Alexandra* sailed from Goole with a record shipment of coke from the port. This consisted of 1,350 tons of coke as cargo, and 100 tons of coal for bunkers; the loading was done in remarkably quick time, the vessel being under the hoists just over twenty-four hours and receiving the contents of 203 waggons. Messrs. Worm & Co. were the local agents.

Hull Shipping Trade.—The nett registered tonnage which entered the port of Hull in 1912 was 6,168,500 tons, which is only 8,000 tons behind the record for the port in 1910, and is the second highest total in the history of the port. Comparing it with 5,822,280 tons in 1911, an increase on the year of 346,220 tons is shown. Of the total, 3,603,060 tons entered the docks of the North Eastern Railway Co., and 2,565,431 tons those of the Hull and Barnsley Railway Co. All the coal hoists in the several docks are fully employed. From the colonies exporting wool, very large steamers have been and are still arriving at the port, including steamers of the P. & O. Co. The port has a great future in the wool trade. The Hull graving docks are kept fully employed; in several instances steamers have gone across to Immingham to dry dock. This will no doubt be remedied when the new Hull Joint Dock is opened, which will include two very large graving docks.

Humber Tunnel.—This scheme has not been lost sight of, the Hull Chamber of Commerce, under the chairmanship of Oswald Sanderson, Esq., managing director of the Wilson Line, has raised the question again, so it will probably mature in due time. It is a question for the several railway companies that have running powers into Hull, and it is hoped that the Hull Corporation will assist the railway companies.

Messrs. Earle's Shipbuilding and Engineering Co., Ltd., are keeping exceedingly busy with new tonnage; the s.s. *Albano*, built for the Wilson Line Stockholm trade, has undergone her trial trip, and everything worked satisfactorily. The patent slip in the yard has been fairly employed with local and outside steamers. The H.M.S. *Veltirn* has been on the patent slip for repairs, etc. The outside staff is fully employed with repair work in the several docks.

Messrs. Cooper & Co., Ltd., are exceedingly busy with repair and graving dock work, the following vessels being in:—S.s. *St. Petersburg*, receiving stern and bow plates and other repairs; s.s. *Hull Trader*, receiving extensive repairs to bottom; R.M.S.P. *Potaro*, general repairs, also holds repaired where new insulation material required; s.s. *Aldebarn*, main boiler retubing, new funnel and casing renewed and engine and deck repairs. The branch shop at Alexandra Dock is fairly well employed. The Company's graving dock is booked up for some time to come, and the moulding shop at the Neptune Works is fully engaged with castings for the several works around Hull, and for the Company's patent propellers for home and foreign orders.

Thomas Tate, engineer and boilermaker, has been busy during the month on the following steamers:—S.s. *Saxon Queen*, engine repairs; s.s. *Owan Tudor* in graving dock for survey, tail shaft drawn and machinery opened out; *Reliance*, engine and boiler repairs; tugs *Jno. Blake*, *Vulcan* and *Vermont*, engine repairs.

Messrs. Stewart & Craig have had the following steamers undergoing repairs:—S.s. *Kate*, s.s. *Erika*, s.s. *Rodney*, s.s. *Norlands*, s.s. *Jessie*, s.s. *Strathgarry*, s.s. *Sandhill*, s.s. *Willy*.

Messrs. Woodall & Co.—The smiths' shop is fully employed in forgings for several small shipyards, stems and rudder posts and forgings for the L.C.C. and other Corporations. The outside staff are busy at the Hull Corporation trams power station and on the s.s. *Solli* and s.s. *Sluorth*, which have been damaged during recent gales.

Messrs. Amos & Smith — Every department of this firm is exceedingly busy and orders are still being booked for boilers and machinery for delivery next year. The outside department and branch shop at Alexandra Dock have plenty of repair and graving dock work on hand. During the last few weeks a number of steamers have come to the port damaged during the late gales and some of those are undergoing very heavy and extensive repairs. The Albert Dock works machinery is running night and day to compete with the orders flowing in.

Messrs. North-East Coast Engineering Works (Hull), Ltd., have had a fairly good month in repairs on the following steamers:—S.s. *Vellore*, s.s. *Bamburg*, s.s. *Ardmount*, s.s. *Rose Lea*, s.s. *Quarnero*, s.s. *Benedick*; also tug *Powerful*, seagoing lighter *Queen of the Bay* and barque *Sunlight*. The s.s. *Vellore* has sustained very heavy weather damage, and extensive repairs on deck and in engine-room are required. The machinery is being opened out on several of the mentioned steamers for Lloyd's survey.

Fish Dock.—The several engine and boiler shops around the St. Andrew's Dock seem fairly busy repairing trawlers damaged through the late gales off Iceland and the North Sea. The patent slips on the dock belonging to the North-Eastern Railway Co. are booked up for some time to come. Several of the trawlers are undergoing their annual inspection for Lloyd's survey.

Messrs. Cochrane & Sons, Ltd., are building new trawlers, drifters, coasters, tugs and barges for various parts of the country, and have sufficient work in hand practically for all this year. They have several trawlers at Hull now fitting out with machinery, etc., preparing for their trial trips, before passing on to their respective owners. The engines and boilers are fitted by the well-known engine builders, Messrs. Amos & Smith, and Messrs. C. D. Holmes & Co., Ltd., Hull.

SOUTH OF ENGLAND AND ISLE OF WIGHT.

(From our Own Correspondent.)

Southampton.—Messrs. Harland & Wolff have just completed an extensive overhaul on the *La France*, and the vessel left the port on the 18th of last month. Several vessels arrived here during the past month bearing evidence of the severity of the weather conditions. The *Beacon Grange* had a very rough voyage and put in here having sustained very considerable damage to deck fittings, bulwarks, etc. The R.M.S.P. Co.'s *Tamar* also put in with damage to propeller, and the same Company's West Indian mail steamer *Orotava* also sustained extensive damage whilst on the homeward passage from the West Indies. The stokehold and engine-room were flooded, and the bilges choked with coal whilst extensive damage was done on deck; three lifeboats being smashed and carried away. The *Vauban*, which was sent to the assistance of the *Vimeiro* at Leixoes, also had a very rough time, but did not sustain any serious damage. The coastal steamer *Hessle*, of Goole, is about ten days overdue at the time of writing on a voyage from Southampton to Bremen, and it is feared must have foundered with all hands. The Trafalgar Dry Dock is not expected to be ready until the end of March, which will be about the time the *Olympic* is expected round here, meantime several big repair jobs have had to be sent elsewhere, which could have been attended to here had the dock been available. The steamer *Rotterdam* has gone to Liverpool, but doubtless would have come here but for the fact of the dock not being ready. On the 11th of last month an auxiliary stop valve on the *Araguaya* burst, causing the death of three boiler scalers who were working on the boiler top at the time, and seriously scalding several other men. The victims had impressive funerals, and the R.M.S.P. Co. are doing everything possible to meet the immediate necessities of the relatives, and paying all funeral expenses. A verdict of accidental death was returned by the jury at the coroner's court.

Messrs. Simpson, Strickland & Co., Ltd., engineers, etc., Dartmouth, South Devon.—This firm continue to be busy in all departments. During last month trials were run with a 25-ft. mahogany yacht's launch, built to the order of Mr. Wm. Cain, of Liverpool, for his s.y. *Sabrina*. The launch has enclosed triple engines, and an oil-fired boiler. A similar launch is in hand for a Southampton gentleman. Two 50-ft. steam pinnaces for the British Admiralty are in hand, and four steam cutters for South American Governments, and a 30-ft. ship's launch. Two large steel motor barges are making very good progress, also a 64-ft. tug for South America is well advanced. As soon as these berths are vacated work will be commenced on other orders in hand. A large number of machinery orders have been received recently, and the yawl *Lhassa* is at the works undergoing repairs.

Messrs. J. Samuel White & Co., Ltd., engineers and shipbuilders, East Cowes, Isle of Wight. For tonnage on hand see last month's notes. A settlement was arrived at in connection with the strike of shipwrights at Cowes, and work was resumed by the men on Monday, the 13th of January.

Messrs. Day, Summers & Co., Ltd., Northam Ironworks, Southampton.—The steam yacht *Jason*, 743 tons B.M., designed and built by the firm to the order of Mr. Frank Bibby, of Hardwicke Grange, Shrewsbury, went out for official trials on the 8th and 9th of last month. On the 8th she ran speed trials and progressive trials over the measured mile in Stokes Bay, when the engines developed 1,350 i.h.p. and the contract speed was exceeded by nearly half a knot. On the 9th she went round the island, and encountered a heavy sea. The vessel proved herself an excellent sea boat, and maintained a speed of 13 knots throughout the run. She returned to the builders' yard and then left for the Mediterranean. The dimensions of the yacht are: Length, 178 ft. on the water line; beam, 28 ft. 6 in.; depth, 16 ft. 6 in. The engines are two sets of quadruple-expansion engines with cylinders 10½ in., 15 in., 21½ in., 30 in. with 21 in. stroke, working at a pressure of 215 lbs. per square inch. The crank shafts are balanced and the engines throughout the trials worked with great smoothness and absence of vibration. The pontoon for the 60-ton sheers for Messrs. S. Pearson and Sons, Ltd., was dismantled and despatched to Liverpool for export to Valparaiso, and the sheer legs and machinery will shortly follow. The machinery for the 130-ton sheers for Spain is well advanced. The firm have just received an order from the Admiralty for another instructional turret for Devonport similar to those already built for Eastney, Chatham, Devonport and Whale Island. Several yachts are at the yard for survey and overhaul.

Messrs. J. I. Thornycroft & Co., Ltd., Woolston Works, Southampton.—Good progress is being made with the following destroyers—H.M. ships *Hardy*, *Paragon*, *Porpoise*, *Unity*, *Victor*, *Daring* and *Dragon*. The *Hardy* will shortly be running trials. Satisfactory progress continues to be made with the paddle tugs *Sturdy* and *Strenuous*, and with the Diesel-engined yacht. The riveting of the shell plating for the passenger and cargo steamer for Trinidad is completed, and good progress is being made with the composite cargo vessel for Peru. The motor passenger vessel for New Zealand is almost ready for launching, and the deck plating on the lightship for Trinity House is well advanced. Canadian Customs cruiser.—The keel is laid and the work of adjusting the frames is proceeding. Orders have been received from the British Admiralty for motor launches of 20 ft., 30 ft., 32 ft., 35 ft., 45 ft., and 50 ft. in length.

THAMES.

(From our Own Correspondent.)

Deep-Water Jetty.—A further improvement is to be made by the proposal of the Port of London Authority to erect a deep-water jetty at Tilbury, thus giving additional facilities for shipping in the Thames. The tender of Messrs. Perry and Co. for £105,466 has been accepted for the construction of this jetty, which is intended mainly for the use of vessels arriving with part cargoes, and which, while demanding deep water for their discharge, desire to remain for as short a while as possible in port. The jetty will be 1,000 ft. long and 50 ft. wide, and will have railway communication with the shore. The most modern equipment will be provided for the rapid handling of goods into barges.

Orient Steam Navigation Co.—At the ordinary general meeting of this Company, the Chairman gave the profit for the year as £256,388, or, with last year's carry forward, as £289,085. A dividend of 5 per cent. was declared, and a cash bonus of £5 per cent. on the Deferred shares. £53,215 goes forward to the next account.

Thames Lightermen.—The Board of Trade enquiry into the matter has finished its labours, and the report has, as far as we understand, been presented, but at the time of going to press is not published. The point of view of the Port Authority is that it is not necessary to apprentice a lad at fifteen or sixteen to become a lighterman, and that two years' training is sufficient for the purpose. That the trade of the Port of London was at the mercy recently of lightermen is held to be a very serious position, and ought to be altered.

Thames Ironworks Co.—The Chairman of this Company, Mr. Hills, has made an appeal against the Judge's decision to sell the assets of the Company, and failed. Mr. Hill asked that the Receiver should be allowed to borrow £50,000 to carry on the business of the Company, and the decision of the Court is against any such prior claim, which the lender would have as against the Debenture holders. It will now be seen what is the real position in this matter from a financial standpoint, but in the meantime the Admiralty order for engines for the new cruiser will not be proceeded with.

New Salvage Tug.—Messrs. Merryweather, of Greenwich, have supplied a salvage and fire tug to the Port of Naples, the vessel being 114 ft. long, with a beam of 19 ft., the engines being triple-expansion of 500 I.H.P., and developing a speed of 10 knots. There are three boilers, one coal-fired and the

other two with oil fuel. The fire pumps can be used for salvage purposes, the combined capacity for such purpose being 2,400 tons per hour. The vessel answered all expectations.

Trinity House. By an order of the King, the Elder Brethren of this Corporation will in future have the title of Captain, and rank immediately after Captains in the Royal Navy, a record being made in the College of Arms for this command by the Duke of Norfolk.

MERSEY AND MANCHESTER SHIP CANAL.

(From our own Correspondent.)

Messrs. Cammell, Laird & Co.—With the putting into commission of H.M.A.S. *Melbourne*, Australia has completed another step in her naval policy. This vessel underwent her formal acceptance trial on January 17th, and left for Portsmouth the next day. This vessel is a sister ship to the *Sydney*, built at Govan, and also the *Brisbane*, now building at Cockatoo Island, Sydney, N.S.W. In this connection Mr. C. C. Dudley is leaving the staff of Messrs. Cammell, Laird & Co. to take up a position in the turbine department of the Australian Government at Cockatoo Island. Mr. Dudley, who has gained his experience entirely with the Birkenhead firm, was presented by Mr. J. H. Gibson, engineering manager, on behalf of the staff with a valuable gold stop watch and prismatic compass. It is understood that Mr. S. J. Wavish, at present outside manager in the shipyard of Messrs. Armstrong, Whitworth & Co., Elswick, has accepted the position of shipyard manager at Birkenhead, under Mr. Carter, general manager. Mr. George Wright, at present employed with Messrs. Parsons, has been appointed to a responsible position in the engineering works of Messrs. Cammell, Laird. Mr. T. C. Tobin, head of the ship designing department at Birkenhead, has accepted an important position with Messrs. Harland & Wolff, of Belfast. Mr. A. E. Clapham, until recently head foreman loftsman with Messrs. Vickers, has been appointed to a similar position with Messrs. Cammell, Laird & Co. Mr. Henry Mathewson, formerly assistant foreman shipwright at Barrow, has accepted the position of head foreman shipwright at Birkenhead. Mr. Mathewson has been employed at the Naval Construction Works at Ferrol. H.M.S. *Audacious* has now received her guns and most of her armour, and is fast nearing completion, while the machinery for H.M.S. *Iron Duke* is well in hand and is being shipped to Portsmouth, where the vessel is being outfitted. The second Norwegian Atlantic liner will shortly take the water, while the Isle of Man steamer and the destroyer *Garland* are nearly at the launching stage. The meat barge *Doon* was launched on January 21st. A large number of barges are on order for foreign shipment. One of the most important repair contracts recently secured by this firm is the extensive repairs which are to be carried out to the Canadian Northern liner *Royal George*. This vessel, it will be remembered, ran aground in the St. Lawrence, and after salving was temporarily repaired at Halifax, and after discharging her cargo of timber at Liverpool, has been docked at Birkenhead. After complete examination, repairs will be put in hand which will occupy some three months. The Norwegian steamer *Lovstakken* left some weeks ago after extensive repairs, but, experiencing very heavy weather, it was deemed advisable to redock and make a survey. Everything was found to be satisfactory, and after various repairs to deck damage she again left port. The Midland Railway Company's steamer *Londonderry* has been in dock for turbine repairs.

Messrs. H. & C. Grayson.—An important repair contract secured by this enterprising firm is repair work to be carried out on the Holland-American liner *Rotterdam*. The Allan liner *Victorian* has been in for overhaul and renewal. The Cardiff steamer *Silurian* has undergone extensive bow and stern repairs, due to collision damage when leaving the Mersey.

Messrs. Isaac Pimblott & Sons.—A successful trial trip has recently taken place on the Mersey of the oil-engined lighter *Itu*. This craft was constructed for Messrs. Elder, Dempster's cross-river trade at Calabar, by Messrs. Pimblott at their Northwich works, from designs and specifications prepared by Mr. J. B. Wilkie, superintendent engineer to Messrs. Elder, Dempster. The *Itu* is 59 ft. long, 15 ft. beam and 5 ft. 3 in. deep, carrying 40 tons deadweight on 4 ft. 6 in. draught, and is built of steel throughout. The main hatchway is 22 ft. 9 in. long by 9 ft. 6 in. broad, and is fitted with deep coamings and special jib crane. The oil engine installation consists of two 25 B.H.P. Bolinders direct-reversible heavy oil engines, driving twin-screws. The consumption on normal load is 3·8 gallons of gasoleum fuel per hour, 400 gallons being carried in a tank under the bridge. 8½ miles per hour was obtained under adverse weather conditions. The *Earlshall*, which recently ran her trials on the Mersey, was also fitted with Bolinders engines. The engines for both these vessels were supplied by Messrs. James Pollock, Sons & Co., of London and Liverpool, Mr. Fred Pollock, the Liverpool representative, having conducted both trials.

Messrs. Isaac J. Abdela & Mitchell, Ltd.—This firm have a good number of orders on hand at their Queensferry Works, including motor lighters, launches and several extensive repair contracts. This firm anticipate a large business in the motor-boat and lighter trade, for which there seems to be a big future.

The Port of Manchester.—It is estimated that Manchester is fast becoming the distributing centre for such imports as American cereals. During the last twelve months 200,000 cases have been received. The chief source of trade to the Canal is from cotton, timber, grain, fruit, oil, paper. The large industrial area around Manchester requires an immense quantity of raw material. Out of 36,305,040 gallons of petroleum products shipped to Great Britain in November, Manchester received 3,469,890 gallons, and Liverpool 3,280,500 gallons. The opening of the Panama Canal is expected to give an impetus to cotton imports.

Lancashire and Yorkshire Railway Co.—This Company have recently placed an order with the Clyde Shipbuilding and Engineering Company for two steamers for their Goole and Continental trade. These steamers will be of a highly improved type and will have a high speed.

The King's Visit to Liverpool.—It is expected that His Majesty will visit Liverpool in July, when it is hoped that he will open the new Gladstone Dock, by entering it on board a Cunard liner, probably the *Lusitania*. It is probable that a review will take place of the Merchant Navy in the Mersey, and at the same time several battleships may be expected to escort His Majesty.

Dock Accommodation in New York.—Due to the enterprise of Boston's Harbour Authorities, the New York Board is expected shortly to take action in the matter of improved facilities. £10,000,000 has been voted for this purpose, and property to the value of £30,000,000 will be acquired along the Brooklin waterfront for a municipal docks system, which, when completed, will be one of the finest in the world.

Canada and the Panama Canal.—In view of the increased traffic resulting from the opening of the Panama Canal, extensive preparation is being made both on the Atlantic and Pacific. At St. Joseph De Levis, Quebec, a dock 1,150 ft. long and 137 ft. wide, 45 ft. deep will be constructed. It is also intended to construct a similar dock at Vancouver. Docks almost as large are also to be constructed at Sydney, C.B., and St. John, N.B., whilst the Vickers' floating dock is now available at Montreal, having a lifting capacity of 25,000 tons.

Australian Shipbuilding.—Shipbuilding in Australia is developing apace, and apropos of the *Sydney* and *Melbourne* recently built in this country, it may be of interest to note that a sister cruiser, the *Brisbane*, is now under construction at the Australian Government Dockyard at Cockatoo Island, Sydney. Last year three vessels were constructed and engined at the dockyard, while this year the *Brisbane*, cruiser, and the destroyers *Torrens*, *Swan* and *Derwent* and a dredger will be built there. The machinery for the destroyers and the boilers for the *Brisbane* will be built at Cockatoo Island, while the *Brisbane's* engines will be built in this country.

NORTH-WEST OF ENGLAND.

(*From our Own Correspondent.*)

Barrow-in-Furness.—The activity which has prevailed in the shipbuilding trade of this district for some time past has become more and more pronounced, inasmuch as the orders which have been booked are found to require an increasing number of skilled and unskilled workmen to ensure delivery at the times fixed upon. A couple of months ago, Messrs. Vickers, Ltd., announced through their principals that they had need of an additional 1,000 workmen, and now they state they are in a position to find employment for another 2,000 workmen. At present they are employing in their various departments over 15,500 hands, and are paying £30,000 in wages. There is every reason to believe that ere long these gigantic works will find employment for 20,000 men, as they are growing in size month by month, and further extensions of an important character are receiving consideration at the hands of the directors in order to equip the establishment as complete and as up-to-date as possible, so that the firm can, by its own resources, produce warships and high-class commercial tonnage of all classes in their own establishments. The great drawback to the employment of additional hands is the need for a vast number of additional workmen's houses in the town. At present 500 houses are required at least to meet the immediate demand, and there is certainly need of still another 500 houses as dwellings for men they will employ in the immediate future. Some 200 houses are at present being built by private builders, and the Corporation of Barrow is considering a Municipal Dwellings Scheme, which, to begin with, will provide another 300 houses within a few hundred yards of Messrs. Vickers' works. Some of the members of the Council, however, object to the Corporation building houses, and they are arranging to transfer the scheme to a syndicate of private builders. Whether this scheme will mature remains to be seen. Messrs. Vickers, Ltd., a few years ago built 1,000 houses for their workmen on Walney Island, about a mile from their works, and they have offered to guarantee the Corporation 5 per cent. on the money, houses built on this land, would cost. The land is offered at 6d. per yard, against 3/6, the cost per yard in the town of Barrow proper. The sooner houses are built in large numbers the better for the town, the better for Messrs. Vickers, Ltd., and the better chance it will afford for the development of the shipbuilding and marine engineering industry of the town. All parties in the town are agreed that the demand for house accommodation must be satisfied at an early date, and means to that end will certainly be employed.

Prospects of the Future.—Messrs. Vickers, Ltd., are so very well off for orders that they have been compelled of late to refuse new orders of considerable importance which have been offered to them. This is the fact as regards all departments of their works. It is no secret that they could book at once far more business than they have now in hand, and they are now much busier than they have ever been. Those in authority, and who are in a position to form the best judgment of the prospects, declare that the works at Barrow will be kept busy for at least seven years to come, and that is on the assumption that the works and plant are considerably extended, as is proposed. There never were such bright prospects before the trade, and there is no firm in the country which is doing more than Messrs. Vickers, Ltd., to meet the need of increasing the capacity of building ships and engines.

Progress of Work.—The progress of the work in hand is generally speaking very satisfactory. As regards the British super-"Dreadnought" *Delhi*, work has not been so great as would have been the fact had it not been for the accident to the overhead cantilever crane, which was used for lifting heavy weights into the ship or on to her sides, but temporary jib cranes have been provided to facilitate work, and later on some up-to-date permanent crane appliances will be erected. Much advance has been made in the work of building the Turkish super-"Dreadnought" *Reshad* V., and it will not be long before she is ready for launching. So soon as the two berths occupied by the *Delhi* and *Reshad* V. are vacant, there is no doubt the firm will be ready to lay down two equally large warships, either for the British Admiralty or for Foreign Powers. The keel have been laid for the two light armoured British cruisers, and also for the 8,000-ton tank oil ship for the Admiralty. The three Brazilian monitors are making headway in construction, and it is expected they will soon be ready for launching. These are busy times in the submarine department, where the Vickers' firm are at work on several vessels—"E" class—for the British Admiralty. These craft are three times the size of the first submarines built, but an experimental submarine even larger still is being built, particulars as to which are being kept secret.

Engineering.—During January, Messrs. Vickers, Ltd., have despatched by steamship to Japan a duplicate set of turbine engines for a sister-ship to the battle-cruiser *Kongo*, now being fitted up for the Mikado's Government in the Bucclench Dock. The latter vessel is gradually nearing completion, and will be ready for her trials in a few months. The engineering shops are filled with orders for steam turbines of large and small power, and they are also busy with several oil engines of large and small power. There is, indeed, great development going on in oil-engine design and production. Orders for gun-mountings are very largely held at Barrow, and plenty of additional orders can be booked.

Hæmatites.—The hæmatite iron trade is very brisk, and orders are well held. Prices firm at 86/6 for Mixed Bessemer Nos. nett f.o.b., and warrant sellers 83/- cash.

Steel.—The steel trade in the district is very busily employed, and the demand for shipbuilding material is active.

BELFAST.

(*From our Own Correspondent.*)

Messrs. Harland & Wolff have not put any further vessels in the water since the launch of the Australian White Star liner *Ceramic*, on 11th December, and it will be some little time before any of the vessels at present on the stocks are ready for launching. They have, however, a tremendous amount of work on hand, and a number of vessels of large dimensions are fitting out. Good progress is being made with the alterations on the *Olympic*. The vessel still occupies the new graving dock, where she will remain for a month or so yet.

Messrs. Workman, Clark & Co.—Just a few days before writing, news came to hand of the stranding of the Lamport and Holt liner *Veronese* on the Portuguese coast, with, unfortunately, loss of life. The *Veronese* was built by Messrs. Workman, Clark & Co., in 1906, and she had just left their hands after having undergone very extensive overhaul and alterations, including the fitting of additional first-class staterooms, an extension of the dining saloon on the shelter deck, and the erection of a deckhouse on the bridge deck, containing state-rooms, smoke-room, and music-room. These alterations and additions involved a big expenditure, and it is most unfortunate that the vessel should have been lost on the first voyage after her owners had brought her so thoroughly up-to-date. Messrs. Workman, Clark and Co. also have orders on their books which will keep both yards in full swing for a long time to come. They have carried out a considerable amount of repair work lately.

Messrs. MacColl & Co.—On 18th January the new coasting steamer *Sligo*, built by the Dublin Dockyard Co., Ltd., and engined by MacColl & Co., Ltd., had a successful loaded trial in Belfast Lough. The vessel was constructed to the designs of Mr. James Maxton, of Belfast, for the Sligo Steam Navigation Co., and after completion of her trials sailed for Sligo with a cargo of grain.

MESSRS. DOBBIE, MCINNES, LTD., GLASGOW.—The nautical department is now attended to by Mr. John Morton and Mr. James Mackie (with a competent staff), Mr. W. W. Gebbie having ceased to be with the Company.

LAUNCHES AND TRIAL TRIPS.

LAUNCHES—English.

Strinda.—On December 11th, Messrs. William Doxford and Sons, Ltd., launched from their yard at Pallion the steamer *Strinda*, which they have built to the order of Mr. J. Ludwig Mowinckel, of Bergen. The vessel, which is 455 ft. long, has a deadweight capacity of 11,000 tons. She is a sister ship to the *Grena*, recently launched by Messrs. Doxford for the same owner. Particular attention has been given to the accommodation of the officers and crew. The crew have the exceptional privilege of separate rooms containing two beds. This applies to the sailors and firemen, the former being in the forecastle and the latter in the poop. There are also special mess rooms and wash-houses for each section of the crew. During construction the vessel has been superintended by Captain Olaf Olsen and Mr. J. Houston on behalf of the owner. The classification is with the Norwegian Veritas. Messrs. Wailes, Dove & Co.'s "Bitumastic" enamel was applied throughout the bunkers, tanks, etc., and their patent "Bitumastic" covering to the tank tops.

Sapphire.—On December 16th, there was launched from the yard of Messrs. Cochrane & Sons, Ltd., shipbuilders, Selby, a steel screw trawler, the principal dimensions being 133 ft. 4 in. by 23 ft. by 13 ft. moulded. The vessel has been built to the order of Messrs. The Kingston Steam Trawling Co., Ltd., Hull, and will be replete with all the latest improvements for the fishing trade. She will be fitted with powerful triple-expansion engines by Messrs. C. D. Holmes and Co., Ltd., of Hull.

Harpathian.—On December 23rd, there was launched at Sunderland the steamer *Harpathian*, which has been built to the order of Messrs. J. & C. Harrison, Ltd., London. Her dimensions are:—Length, 400 ft.; breadth, 53 ft.; and depth moulded, 28 ft. 6 in. She is a complete shelter-deck ship, and has been built to take Lloyd's 100 A1 class. Messrs. Wailes, Dove & Co.'s "Bitumastic" enamel has been applied throughout the tanks, bunkers, and their patent "Bitumastic" covering to the tank tops.

Tynehome.—On January 6th, there was launched at Sunderland the screw steamer *Tynehome*, for Messrs. Common Bros., of Newcastle. She is of the single-deck type, with poop, bridge and forecastle, and perfectly clear holds, and is designed to carry 5,500 tons deadweight on a light draught. Water ballast is provided for in double bottom and also in after-peak tank.

Joachim Brinch Lund.—On January 7th, Messrs. Osbourne, Graham & Co. launched from their yard at Hylton, Sunderland, the steel screw steamer *Joachim Brinch Lund*, which they have specially constructed to the order of Messrs. J. Lund & Co., of Bergen. Her principal dimensions are 256 ft. by 37 ft. 9 in. by 18 ft. 3 in., moulded, and the vessel is of special interest owing to the fact that she has been built on the Monitor patent system, and makes the fifth vessel of this type. She is on the single-deck principle with poop, bridge with accommodation on top, and forecastle, and very complete specifications. Rooms for the captain and officers are tastefully fitted out in hardwood and are of large size. The vessel carries 2,450 tons on a very shallow draught, and is equipped with the most modern deck appliances, there being amongst other items five large steam winches by Messrs. John Lynn & Co., and a multitubular donkey boiler supplied by Messrs. Riley, of Stockton. She has been constructed under special rules to Norske Veritas survey, and also fulfils the requirements of Sjfartskontoret Rules. Water ballast is in both peaks and throughout double bottom, thus enabling the steamer to make long passages light with the greatest safety. Engines which have been designed to drive the vessel at a high rate of speed are being supplied by Messrs. George Clark, Ltd., having cylinders 19 in., 31 in. and 51 in. by 36 in. stroke, with large boiler power.

Michael Whitaker.—On January 7th, Messrs. Wood, Skinner & Co., Ltd., launched from their shipbuilding yard at Bill Quay, Newcastle-on-Tyne, a new steel screw steamer built to the order of Messrs. Michael Whitaker Steam Shipping Co., Ltd., of Leeds. The vessel is a self-trimming collier of the raised quarter-deck type, with long bridge and topgallant forecastle, and will be fitted with all the latest improvements, including complete electric light installation throughout. Ample water ballast is provided in cellular double bottom all fore and aft and in fore and after peak tanks. The cabin accommodation is under the bridge deck amidships and in deck-house above, while the officers' and engineers' quarters are at the after end of engine casing under bridge deck and the crew in the topgallant forecastle. The machinery, which is of the improved triple expansion type, has been constructed and will be fitted by Messrs. George Clark, Ltd., of Sunderland. Both the ship and engines have been built to the requirements and under the special survey of Lloyd's for their highest classification, and have also been superintended during construction by Mr. A. E. Smith, M.I.N.A., consulting engineer, of Goole. The vessel is intended for the Baltic and Mediterranean trade, and will be under the management of Messrs. H. W. & C. M. Ezard, of Goole. The principal dimensions of the vessel are:—Length between perpendiculars, 260 ft.; breadth, 37 ft. 6 in.; depth moulded, 18 ft. 7 in., and she is designed to carry a deadweight cargo of 2,500 tons on 17 ft. mean draught of water. The engines are 10 in., 31 in. and 51 in. diameter by 36 in. stroke, with two boilers 12 ft. 9 in. diameter by 10 ft. 6 in. long and 180 lbs. working pressure.

Roumanian Prince.—On January 7th, there was launched from the yard of the Tyne Iron Shipbuilding Co., Ltd., of Willington Quay-on-Tyne, a steel screw steamer of the following dimensions, *viz.*:—Length, 370 ft.; breadth, 48 ft. 2 in.; depth, moulded, 28 ft. 3 in. The vessel, which has been built to the order of Messrs. The Prince Line, Ltd., Newcastle-on-Tyne, is designed for the purpose of carrying petroleum and other oils in bulk and is built on the "Isherwood" patent system of longitudinal framing and to the highest classification at Lloyd's. The vessel is fitted with a very complete oil-pumping installation, including oil pumps of large size for working against a heavy back pressure, and is also fitted with a complete system of steam-heating coils in each oil tank. The accommodation, which is much superior to the ordinary class of vessel, has been carried out to the special requirements of the owners and includes steam heating and electric light throughout. The machinery, which has been constructed by Messrs. The Wallsend Shipway and Engineering Co., Ltd., consists of engines having cylinders 25 in., 42 in. and 68 in. by 48 in. stroke with two boilers working at a pressure of 180 lbs.

Edlington.—On January 8th, Sir Raylton Dixon & Co., Ltd., launched from their Cleveland Dockyard, Middlesbrough, a fine steel screw collier which they are constructing to the order of Messrs. The Denaby and Cadeby Main Collieries, Ltd., of London, etc. The vessel is being built to class 100 A1 at Lloyd's and is of the single-deck type with poop, bridge and topgallant forecastle. Her principal dimensions are 372 ft. by 52 ft. by 26 ft. 3 in. moulded, and she will carry about 7,100 tons on a light draught of water. Saloon and accommodation for captain will be provided in large deck-house at fore end of bridge and charthouse on top. The engineers and officers will be berthed in houses at sides of engine casing, while the crew will be located in forecastle. The vessel will have four large holds, five hatches, two masts, eleven derricks, and will be equipped with ten steam winches, steam windlass, hand and steam-steering gear and all the latest and most modern appliances for the rapid handling of cargo. Triple-expansion engines having cylinders 25 in., 40 in. and 67 in. by 45 in. stroke, supplied with steam by three large single-ended boilers working at 180 lbs. pressure, will be fitted by Messrs. George Clark, Ltd., Sunderland.

Trevethoe.—On January 8th, there was launched from the shipbuilding yard of Messrs. John Readhead & Sons, Ltd., West Docks, South Shields, a steel screw steamer built to the order of Messrs. Edward Hain & Son, St. Ives, Cornwall. The dimensions of the vessel are 381 ft. by 51 ft. by 27 ft. 8½ in., and she carries a deadweight cargo of 7,850 tons on a light draught of water. She is of the improved single deck type, to Lloyd's highest class and under their special survey, having poop, extra long bridge, and topgallant forecastle, with deep girder framing and cellular double bottom fore and aft, with large after-peak tank for water ballast. Holds are clear of beams and other obstructions. The outfit of the ship is very complete for general and grain trades, with shifting boards all fore and aft, and large hatchways as feeders. A full equipment of steam winches and derricks is fitted for the rapid loading and discharging of cargoes. The vessel will be fitted with triple-expansion engines, also constructed by Messrs. John Readhead & Sons, Ltd., having cylinders 26 in., 42 in.

and 69 in. with 48 in. stroke, supplied with steam from the two large steel boilers working at a pressure of 180 lbs. per square inch.

Joseph Constantine.—There has been launched at South Shields a finely-modelled steel screw tug named the *Joseph Constantine*, which has been built to the order of the Tees Conservancy Commissioners. This vessel, which has been specially designed for ocean and harbour towage service, and also for pilotage service at the Tees mouth, is of the following dimensions :—100 ft. by 22 ft. by 12 ft., and is built under the special survey of Lloyd's for their 100 A1 class. The propelling machinery is of 700 i.h.p., and consists of one set of compound surface-condensing engines having cylinders 20 in. and 42 in. diameter by 27 in. stroke.

LAUNCHES—Scotch.

Star of the Empire.—On December 21st, a steam trawler, built for the Walker Steam Trawling Co., Aberdeen, was launched at that port. The vessel, which was named *Star of the Empire*, is of the following dimensions :—Length, 115 ft. ; breadth, 22 ft. 6 in. ; and depth, 13 ft. 9 in.

Crofton Hall.—On December 23rd, there was launched from the shipbuilding yard of Messrs. William Hamilton and Co., Ltd., Port Glasgow, the steel-screw steamer *Crofton Hall*, which they have built to the order of Messrs. Chas. G. Dunn & Co., Liverpool, for their New York and South American passenger and general cargo trade. The principal dimensions, etc., are as follows :—Length, 420 ft. ; breadth, 52 ft. ; depth to upper deck, 30 ft. 6 in. ; deadweight carrying capacity, 8,300 tons. The vessel, which is built to Lloyd's highest class on the "Isherwood" system of longitudinal framing, embodies all the latest improvements which the builders' large experience of the type can suggest, and has a poop, topgallant forecastle, long bridge with promenade deck above same and boat and navigating decks. Commodious accommodation is provided on the bridge deck for first-class passengers, stewards, stewardesses, etc., with pantries, service rooms, bath rooms, lavatories, etc., all fitted up in superior style. The dining saloon is placed immediately before the passenger accommodation, and is arranged with small tables and chairs in restaurant fashion. On the promenade deck, in a large house at forward end, are placed the drawing-room, two special cabins-de-luxe with bath rooms, lavatories, etc., all *en suite* ; also some additional passenger state-rooms, and rooms for doctor and purser ; at the after end of this deck the first-class smoke-room and bar are fitted, with entrances from deck and from accommodation below. The dining saloon, drawing-room, cabins-de-luxe, and smoke-room are elegantly fitted up. On the navigating deck accommodation is provided for captain (including day cabin and bed-room), officers, chart-room, wheelhouse and shelter. The engineers are accommodated on the bridge deck convenient to engine casing. The principal galley, sculleries, bakery, cooks' rooms, purser's office, and stewards' office are arranged on the bridge deck ; the hospital and dispensary, etc., are placed aft, while the seamen, firemen and petty officers are berthed in the poop. Under the bridge deck is fitted a large refrigerating chamber, divided into four rooms for the storage of provisions, etc., for passengers and crew ; and here also are placed the ordinary store rooms, wine lockers, linen rooms, baggage rooms, etc. A strong bullion room is fitted under the forecastle deck, while the forward 'tween decks is arranged and fitted up for the carriage of special cargo. The vessel is fitted with a complete installation of electric light, installed by the builders' own staff—the generating sets being in duplicate to ensure continuity of supply. The accommodation throughout is heated on the Nuvacummette principle, the plant being supplied and fitted by Messrs. Ashwell & Nesbitt. A complete fire-detecting and extinguishing installation on the most up-to-date method by The Rich Marine Fire Indicating System Co., of New York, has also been fitted. The vessel is equipped for wireless telegraphy on the Marconi system, the operating-room for which is placed on the navigating deck. Water ballast is provided in cellular double bottom and peaks. The arrangements for handling cargo are very complete, and include eleven powerful steam winches, sixteen derricks of steel tube, and one heavy steel derrick suitable for dealing with 30-ton lifts. Houses, forming derrick tables, are built round the masts on bridge deck for the stowage of cargo gear, etc. A steam-steering gear on the Wilson & Pirrie principle is arranged in a house aft, with telemotor control from navigating bridge. In addition to the life-saving appliances, which are in accordance with the latest Board of Trade requirements, the vessel is provided with a motor launch. The machinery is being supplied by Messrs. D. Rowan & Co., of Glasgow, and consists of triple-expansion engines and four large multitubular boilers capable of propelling the vessel at a speed of 12 knots in service.

Palmella.—On December 23rd, there was launched at Leith a steamer named *Palmella* for the London and Portuguese trade of the Ellerman Lme. The dimensions of the vessel are :—Length, 233 ft. ; breadth, 37 ft. ; and depth moulded, 18 ft. 9 in. The steamer has been built in excess of the requirements of Lloyd's for their highest class on the longitudinal girdered pillar system without side stringers or hold beams. A distinctive feature of the hull is a cruiser stern which provides large deck space in the poop and which will prove beneficial when the vessel is in a heavy following sea. Triple-expansion engines will be supplied, having cylinders 16½ in., 28¼ in. and 48½ in. diameter, with a 33-in. stroke.

Florentine.—On December 27th, the Clyde Shipbuilding and Engineering Co., Ltd., Port Glasgow, launched a steel screw steamer 280 ft. by 42 ft. by 27 ft. to shelter deck, for R. F. Sanderson & Co., Manchester. The vessel was named *Florentine* by Mrs. Rolland, and immediately after the launch was placed in the Company's dock to receive her machinery, which has also been constructed by the builders. The vessel and her machinery are being constructed throughout under British Corporation survey, for their highest class.

Nevasa.—Messrs. Barclay, Curle & Co., Whiteinch, launched recently the new twin-screw mail and passenger steamer *Nevasa*, which they have built for the British India Steam Navigation Co. The vessel, which is intended for service between London and the East, is about 9,456 tons. She will be supplied by the builders with quadruple-expansion engines of 7,500 i.h.p. The *Nevasa* is a sister ship to the *Neuralia*, which was launched from the same yard in September. In addition to these two vessels the firm have on hand four other liners for the same owners.

Pascal.—Messrs. Archibald M'Millan & Son, Ltd., Dumbarton, launched recently the steamer *Pascal*, the first of two vessels they are building for Messrs. Lamport & Holt, of Liverpool. The vessel is of the following dimensions :—Length between perpendiculars, 415 ft. ; breadth extreme, 56 ft. ; depth moulded, 39 ft. 9 in. She is constructed with clear holds, and has large water ballast capacity in cellular double bottom, both peaks and in a deep tank amidships. The appliances for the rapid handling of cargo include sixteen derricks (suitable for loads up to 15 tons). The machinery, which is of large power, is being supplied by Messrs. David Rowan & Co., Glasgow. The vessel and machinery have been built under the special survey of Lloyd's for their highest class.

Lancefield.—Messrs. Charles Connell & Co., Scotstoun, launched recently the steamer *Lancefield*, which they have built for the Glasgow Steam Shipping Co., for whom Messrs. John Black & Co., Glasgow, are the managers. The vessel is about 5,850 tons gross, and has been constructed to Lloyd's highest class, all the latest requirements for the rapid and efficient handling of cargo being provided. Triple-expansion engines will be supplied by Messrs. Dunsmuir & Jackson, Govan.

Koning Albert.—There has been launched at Govan the steam trawler *Koning Albert*, which has been built for the Société Anonyme Pecheries d'Islande, Ostend, Belgium. The dimensions of the vessel are :—Length, 115 ft. ; breadth, 21 ft. 6 in. ; depth, 12 ft. 9 in. ; and gross measurement, 220 tons. The trawler will be fitted with triple-expansion engines.

Linmere.—On January 22nd there was launched from the yard of Murdoch & Murray, Ltd., Port Glasgow, a steel screw steamer of the following dimensions :—Length 265 ft., breadth 38 ft. 6 in., depth moulded to shelter deck 26 ft. 4½ in. The vessel is built to Lloyds highest class, and has all the latest arrangements for loading and discharging cargo. The vessel has been built to the order of Messrs. Herbert Watson & Co., Manchester, for their general trade, and is named *Linmere*.

Triple expansion engines will be fitted on board by Messrs. Muir & Houston, Ltd., Glasgow. The vessel and machinery have been built under the superintendence of Messrs. A. C. Hay & Smart, of Liverpool.

TRIAL TRIPS.

San Eduardo. On December 27th, the steamer *San Eduardo*, the latest edition to the fleet of the Eagle Oil Transport Co., Ltd., sailed from the Tyne on the conclusion of a very satisfactory trial trip. The vessel is an oil-carrying steamer, in every way up-to-date and complete. She is 420 ft. in length by 54¼ ft. beam, will carry over 9,000 tons deadweight on a comparatively light draught of water, and is classed in the highest class in Lloyd's Register. The engines and boilers worked perfectly satisfactorily, driving the vessel at a speed of over 11 knots per hour. For Launch, see January issue.

Penang Maru and Queen Margaret.—On December 31st, trials were carried out on the Firth of Clyde by two new Port Glasgow built steamers the *Penang Maru*, built by Messrs. Russell & Co. for a Japanese firm, and the *Queen Margaret*, built by Messrs. Robert Duncan & Co. for Glasgow owners. Both vessels sailed on January 4th—the *Penang Maru* for Yokohama, and the *Queen Margaret* for New York. For Launch, see January issue.

Helsmuir.—On January 1st, the s.s. *Helsmuir*, built by Messrs. H. Pickersgill & Sons, Ltd., Sunderland, for Messrs. the Strath Steamship Co., Ltd., Cardiff, proceeded to sea and had a most successful trial trip. Her leading particulars are: Length, 391 ft.; breadth, 52 ft., and depth, 25 ft. 6 in. She has been built under special survey to take Lloyd's highest class as a single-deck steamer, with long bridge, and is fitted with cellular double bottom throughout for water ballast, in addition to which the after and fore peaks are fitted as ballast tanks. The vessel is fitted up with up-to-date appliances for rapid and efficient handling of cargo. Electric light is fitted throughout. The engines and boilers were supplied by Messrs. J. Dickinson & Sons, Ltd., Sunderland. During construction the vessel and engines were under the personal supervision of Captain Tedford and Mr. Cambridge, of Cardiff. After the trial the vessel left for Cardiff under the command of Captain Tedford. For Launch, see January issue.

Masarua.—On January 4th, the large steel screw cargo steamer *Masarua*, built by Messrs. David & William Henderson & Co., Ltd., Partick, to the order of Messrs. Maclay and McIntyre, of Glasgow, underwent her trials on the Firth of Clyde. During the trials everything worked to the satisfaction of the owners and builders, a mean speed of fully 11 knots being easily attained. For Launch, see January issue.

Curzon.—The official trials of the twin-screw turbine steamer *Curzon*, built for the South Indian Railway Company by Messrs. A. & J. Inglis, Pointhouse, were completed recently under the supervision of Sir William H. White, late Director of Naval Construction at the Admiralty. The speed trial was made on a measured base of twenty nautical miles. Starting from rest, the vessel completed the distance in 65¼ minutes, the time allowed by contract being 72¾ minutes. The vessel was further tried progressively on the measured mile to establish relations between the speed of the ship and revolutions of the propellers. Other trials were made of the auxiliaries—electric winches and capstan, electric lighting and ventilating fans, distilling apparatus, and refrigerating machinery, which will be used to provide fresh water and ice for the shore stations. All these were found to be fully up to contract requirements. For Launch, see November, 1912, issue.

Steam Tug.—Mr. Edward Hayes, of Stony Stratford, has recently run the trial trip of a steam tug which he has built for service in the West Indies. She is a sister boat to others he has supplied to the Admiralty, many foreign Governments, harbour boards and shipping lines. The vessel is 51 ft. long, and has a draught of about 4 ft. 3 in. She has four bulkheads, and steel floors of extra depth, to give great strength in case of grounding and to minimize vibration. The main engine is a Hayes standard compound surface-condensing one, of the open-front type, having cylinders 8 in. and 16 in. by 10 in. stroke. The crank shaft is balanced and cut from a solid piece of Siemens-Martin steel. Automatic lubrication and water service are both fitted. The air, circulating, feed and bilge pumps are worked off the low-pressure crosshead by long rocking levers. The boiler is of the marine return-tube type, built under Lloyd's survey for 120 lb. working pressure. All the upper woodwork is of teak. The boat's specified speed was 11 miles an hour, but she exceeded this on her trials. She was easily handled and is a good rough-water craft.

Emil L. Boas.—The twin-screw steamship *Emil L. Boas*, which is the second of the two Hamburg-American liners which Messrs. Swan, Hunter & Wigham Richardson, Ltd., Wallsend, have been building, has just completed a successful trial trip at sea. The twin vessel, the *Karl Schurz*, was delivered last October. The leading dimensions of the *Emil L. Boas* are 425 ft. long, 51 ft. broad, 33 ft. deep, the deadweight carrying capacity being 6,100 tons. The ship is to carry about seventy-five passengers only of the first-class. After exhaustive trials the *Emil L. Boas* left for Hamburg under the command of Captain Von Leitner, and Mr. J. Drielingg took charge of the engine-room. For Launch, see December, 1912, issue.

List of Vessels Launched in 1912.

(Received too late for January issue.)

(Continued from page 233.)

GERMAN.

Howaldtswerke, Kiel.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
Adler	—	German	594	—	750
Monte Penedo	—	,,	3,692	—	2,000
Kathe	—	,,	1,962	—	950
Düsternbrook	—	,,	166	—	275
Sioux	—	,,	5,081	—	1,600
9 Pontoons	—	,,	4,000	—	—
Nord, Süd, Ost and West	—	,,	350ea	—	100ea
2 Caissons	—	,,	326	—	—
WORK ON HAND—					
S.M.S. Kaiserin	—	—	—	—	—
S.M.S. Rostock	—	—	—	—	—
Mohawk, Moqui and Kiowa	—	German	5,081ea	—	1,600ea
Mohican	—	,,	5,081	—	1,600
2 Tanksteamers	—	,, total	17,500	— total	6,300

NEW ZEALAND.

J. McGregor & Co., Dunedin.

Name of Vessel.	Built of	Owners.	G.T. Regis.	G.T. inclu. erect.	I.H.P.
† T.S.S. Eatnshaw	Steel	Dunedin	240	—	1,000

† Triple Expansion.

WORLD'S SHIPBUILDING OUTPUT.

THE enclosed tabular matter is taken from Lloyd's Register Annual Return and shows the United Kingdom percentage of Merchant tonnage launched during the years 1910, 1911 and 1912. Vessels of 100 tons gross and upwards are included, and only vessels launched, whether completed or not during the year.

Where Built.	Description.	1910. No.	1910. Tonnage.	1911. No.	1911. Tonnage.	1912. No.	1912. Tonnage.
United Kingdom	Merchant Vessels	500	1,143,169	772	1,803,844	712	1,738,514
	Warships	45	134,645	50	230,786	30	191,737
	Total	545	1,277,814	822	2,034,630	742	1,930,251
Abroad	Merchant Vessels	777	814,684	827	846,296	1007	1,163,255
	Warships	77	176,209	119	538,083	144	342,892
	Total	854	990,893	946	1,384,379	1151	1,506,147
World's Output		1399	2,268,707	1768	3,419,009	1893	3,436,398
United Kingdom percentage of the Merchant Tonnage Launched		58⅝		68		60	

BOARD OF TRADE EXAMINATIONS.

DECEMBER 26th, 1912.—LONDON.—*1st Class*: A. Annett, J. Atkinson, J. Cameron, G. Cooper, J. Millar, H. Owen, R. Whitfield, *2nd Class*: F. Doubleday, J. Feist, R. Gordon, G. Lester.

LONDONDERRY.—*1st Class*: J. Jones. *2nd Class*: R. Craig.

ABERDEEN.—*2nd Class*: R. Burns, J. Flett, W. Park, J. Snrollett, A. Younger.

GREENOCK.—*1st Class*: J. Ruthven, D. Simpson. *2nd Class*: W. Lawson, G. McCallum, D. McLean, A. McMullan.

DOVER.—*2nd Class*: W. Clark.

HULL.—*1st Class*: J. Barraclough, F. Bergwitz, N. Hagestadt, W. Harvey. *2nd Class*: J. Fitz-Clark, J. Wilmot.

LIVERPOOL.—*1st Class*: A. Bath, C. Bowler, W. Flanagan, A. Jones. *2nd Class*: J. Cannell, A. Jackson, C. Link, W. Mason, W. Mathias, A. Munro, G. Parker, J. Penwill, J. Platt, J. Roberts, J. Stevenson, R. Stewart, S. Walker.

NORTH SHIELDS.—*1st Class*: J. Bell, H. Campbell, C. Johnson, J. McMurran, J. Merson, R. Vickers. *2nd Class*: J. Detchon, T. Evans, A. Robertson, L. Scott.

SUNDERLAND.—*1st Class*: T. Hutchinson. *2nd Class*: W. Alderson, D. Crabbe, A. Dowley, W. Hall, H. Heppell, W. Neilson.

JANUARY 2nd, 1913.—LONDON.—*1st Class*: J. Duncan. *2nd Class*: S. Brown.

GLASGOW.—*1st Class*: R. Henderson, D. Lindsay, W. Pearson, P. Purdie, P. Watson, H. Young. *2nd Class*: W. Clyne, E. Mather, W. Millar, W. Mitchell.

LIVERPOOL.—*2nd Class*: H. Macadam, J. Moffat, J. Reynolds.

LEITH.—*1st Class*: C. Cadger, R. Carruthers, J. Johnstone. *2nd Class*: J. Leslie.

FALMOUTH.—*2nd Class*: J. Kerkin.

CARDIFF.—*2nd Class*: W. Page.

JANUARY 9th, 1913.—LONDON.—*2nd Class*: D. Elliott, F. Lloyd.

NORTH SHIELDS.—*2nd Class*: S. Brooking.

LIVERPOOL.—*2nd Class*: J. Connell, F. Highfield, H. Hoffmeyer, A. Jones.

GLASGOW.—*1st Class*: J. Anderson, R. Geddes, T. Graham. *2nd Class*: J. Ferris, A. Geddes, N. Hair, J. Martin, J. Mitchell, J. Munro, D. Pater.

JANUARY 16th, 1913.—LONDON.—*1st Class*: C. Barker. *2nd Class*: W. Bailey, L. Lall, G. Rugg.

HULL.—*2nd Class*: G. Austin, E. Marsh.

DUBLIN.—*2nd Class*: F. Johnston.

NORTH SHIELDS.—*2nd Class*: G. Brown, E. Clark.

LIVERPOOL.—*1st Class*: W. Skinner, J. Tynan. *2nd Class*: N. Sides.

DUNDEE.—*2nd Class*: J. Ellis, A. Gibson, A. Hall.

GREENOCK.—*1st Class*: J. Stewart. *2nd Class*: J. Moir, J. Paterson.

JANUARY 23rd, 1913.—LONDON.—*1st Class*: A. Buck, C. Muir, J. Young. *2nd Class*: W. Bevan, H. Brown, W. Simpson, J. Stott.

GLASGOW.—*1st Class*: J. Dickie, A. Malcolm, E. Redmond, J. Whyte. *2nd Class*: J. Allan, M. Jackson, A. Smith, J. Stark.

LEITH.—*1st Class*: W. Dowling, A. Kinloch. *2nd Class*: A. Alexander, A. Duff.

SOUTHAMPTON.—*1st Class*: W. Lush. *2nd Class*: E. Adams, A. Anderson, S. Hancock, G. Slade.

PLYMOUTH.—*1st Class*: W. G. Gendall.

LIVERPOOL.—*1st Class*: E. Caine, J. Inkester, A. Johnston, W. Parkenham. *2nd Class*: A. Pritchard, G. Rivers, H. Smith.

CARDIFF.—*1st Class*: F. Curry, A. Gardner, D. Thomas. *2nd Class*: S. Burnett, C. Langlois.

NORTH SHIELDS.—*1st Class*: A. Darling, T. Raine, J. Thompson, F. Watson. *2nd Class*: G. Baker, J. Busuttil.

WEST HARTLEPOOL.—*1st Class*: T. Whitelaw. *2nd Class*: T. Booth, T. Clark, C. Fletcher, J. Harvey, T. Lewin, G. Mosley, F. Turnbull.

TECHNICAL SOCIETIES.

MEETINGS have been arranged for the month as follows:—

North-East Coast Inst. of Engineers and Shipbuilders, Newcastle-upon-Tyne.—February 21st.

North-East Coast Inst. (Graduate Section).—February 1st, "Pipe Design," by Mr. J. Dickinson. February 22nd, "Oil Burning Installations in Marine Boilers," by Mr. E. T. Champness, B.Sc.

Inst. of Engineers and Shipbuilders in Scotland, Glasgow.—February 18th.

Inst. of Marine Engineers, London.—February 3rd, "The Thermodynamics of Refrigeration," by Mr. G. James Wells. February 10th, Discussion on Fuel Test. February 17th, "The Manufacture of Steel," by Mr. Percy P. Dowden. February 24th, "Oil Fuel for Marine Engines and Boilers," by Mr. C. Zulver.

Liverpool Engineering Society, Liverpool.—February 5th, "The Phenomenon of Yield Point in Metals under Stress," by Mr. W. Mason. "Some applications of compressed air and its measurement," by Mr. G. J. Gibbs. February 19th, "The Weight Factor in Merchant Ship Design," by Mr. T. C. Tobin.

Association of Engineers-in-Charge, London.—February 12th, "The Control of Alternating Current Motors," by Mr. John T. Mould.

The Inst. of Naval Architects will hold its annual meetings on March 12th, 13th and 14th, in the Hall of the Royal Society of Arts, John Street, Adelphi. The Marquis of Bristol will preside. The annual dinner will be given on March 12th, in the Grand Hall, Connaught Rooms, Great Queen Street, Kingsway.

Calendars have been received from the following firms:—The United States Metallic Packing Co., Ltd., Bradford, an embossed calendar, the subject being this year "Cupid and Pysche"; Messrs. Alfred Graham and Co., London, of loud speaking naval telephone fame, a useful combined almanack, desk diary and blotter; the same firm have also issued a neat little book called "Tide and Speed Tables, 1913"; it is full of information, and the "Special Port Information" is particularly useful. The Welin Davit & Engineering Co., a pack of calendar cards (refills) to fit metal stand already issued by the firm. Messrs. Frank & Sons, Marine Photographers, South Shields, this calendar shows a good illustration of the *t.s.s. Wiltshire*, built by Messrs. John Brown & Co., Ltd. Messrs. Hayward Tyler & Co., Ltd., a pocket book and diary for 1913, containing in addition some useful tabular matter. The Lighthouse Literature Mission, Belfast; Messrs. Shand Mason & Co.; N. V. Werf De Noord, Alblasserdam (Holland), and many others.

MR. HUGH A. ALLAN, chairman of the Allan Line Steamship Co., Ltd., has joined the committee of the British Corporation for the Survey and Registry of Shipping.

THE "TITANIC" ENQUIRY.—A statement has been issued by the Board of Trade to the effect that the *Titanic* enquiry cost £20,231 5s. 10d.

NEW MOTORSHIP COMPANY. There has been registered at Somerset House a new motorship company, by name, The Flow Motor Ship Co., Ltd, with a capital of £1,000,000 in £1 shares. The first directors are Sir Marcus Samuel, Bart., Messrs. S. Samuel, F. Lane and A. Rickmers.

MESSRS. WAILES, DOVE & CO., LTD., have issued a brochure of the history and records of the Company's work, which includes particulars of the work done by the Company on the *Lusitania*, *Mauretania*, *Olympic*, *Imperator*, floating docks, etc.

MESSRS. VICKERS, LTD., have recently issued a well produced and nicely illustrated booklet giving examples of ships built and other work they are capable of doing. The booklet also contains views of the works at Barrow, Sheffield and Erith, and gives an idea of the great resources of the Company.

NATIONAL ALLOYS, LTD., of Ilford, have recently issued a booklet descriptive of their engineering alloys.

We note that Mr. T. F. Best, of Messrs. Best & Bourne, Newhall Street, Birmingham, suppliers of engine stores and requisites, has retired from the firm, and Mr. H. E. Hake, —nephew—has assumed the position for which he has been qualifying during the last three years.

MOTOR YACHT, THELMA.—Recently there was launched from the yard of Messrs. J. and G. Forbes, Sandhaven, the finely modelled carvel built yacht, *Thelma*, to the order of Messrs. Smith & Kennedy, Aberdeen, for a London owner and member of the "Royal Thames Yacht Club," she is 47 ft. over all, and 12 ft. beam, 7 ft. deep, and of 20 tons loaded displacement. Power is provided by a 30 b.h.p. double cylinder direct Reversible "Bolinder" Crude Oil Engine, which drives three-bladed solid propeller of bronze. The motor was supplied by Messrs. James Pollock, Sons & Co., Ltd., the British representatives for Messrs. J. and C. G. Bolinders Co., Ltd. Official trials have been carried out at Aberdeen, and the speed of 8¾ knots attained, which was considered highly satisfactory.

DISCIPLINARY TRAINING.—The Annual Dinner of C Company of the London-Scottish was held on January 25th—a date revered by the Scot—when an excellent gathering of the Company turned out to support their traditions and uphold the dignity of their corps. The prizes gained by members of the Company were distributed amid the acclamations of the audience, and it was impressed on all present to do their utmost to increase the strength of the Company and the corps by advocating its claims among those with whom they might be associated by ties of personal friendship or business connection. The bagpipes were in pleasing evidence of the nationality of the gathering, as were some of the songs which further enlivened the proceedings, while the speeches were to the point in respect to matter and brevity. The advantages to be derived from association with the corps are commended to the consideration of our readers, as there are many engineers in appointments to whom these may appeal.

MESSRS. WAILES, DOVE & CO., LTD., Newcastle-on-Tyne, sole Patentees and Manufacturers of Patent "Bitumastic" Solution, Enamels, Coverings, the well-known Anti-corrosive, during 1912 received orders from the Admiralty for coating 23 battleships, cruisers, etc., in addition to the Huge Floating Dock now in commission at Portsmouth. Their "Bitumastic" Specialities last year were applied to over 640 vessels passing through survey, also new ships for the principal shipowners of the world, on the most vital parts, such as bunkers, engine and boiler room tanks, tank tops, etc. The gross tonnage of the vessels coated is about three million tons, and includes such vessels as the *Imperator* (the largest vessel in the world), *Olympic* and *Ceramic*, the latest White Star Liners; a large contract has also been booked for coating the *Aquitania*, now in course of construction by Messrs. John Brown & Co., Ltd., Clydebank, for the Cunard Line. Their American House has been entrusted with the largest contract ever placed for "Bitumastic" Enamel work, viz.:—The coating of 46 pairs of steel lock gates on the Panama Canal; total area of surfaces to be coated being about 3,400,000 square feet. Patent "Bitumastic" Solution has also been largely used by the leading shipowners, shipbuilders, engineering firms, municipal boards, railway companies, brewers, ice and cold storage companies, collieries, etc., and a large number of contracts carried out for coating with Patent "Bitumastic" Solution, corrugated iron buildings, bridges, smokestacks, colliery head gears, water tanks and pipe tracks.

Abridgments of New Patents.

Compiled by Messrs. E. P. Alexander & Son, Chartered Patent Agents, 306, High Holborn, London, W.C.

19,997. Screw propellers. Propeller blades *c* are surrounded by a ring or narrow band *b* enlarged to form curved plates *a* at the blade tips as shown in Fig. 2. Several such propellers may be mounted on one shaft.

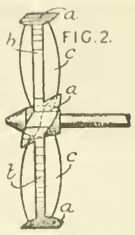


FIG. 2.

20,109. Ships. (Ashes, discharging). Relates to hydraulic ash-ejecting apparatus of the type in which an annular hydraulic stream is caused to converge after passing the ash nozzle, so that the ashes are discharged in the form of a cylindrical jet. The ashes are received in the hopper 1 and pass into the pocket 4 of the intermittently rotating valve 3, from which they are delivered into the ash nozzle 9 by the force of a jet issuing from the pipe 7. The exterior of the nozzle 9 is of conical shape, and is situated within a spheroidal

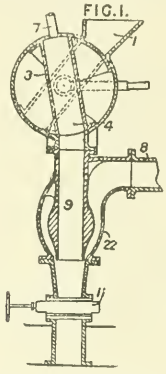


FIG. 1.

hydraulic chamber 22 supplied with water under pressure by the pipe 8. The stream past the nozzle is thus of annular section converging after passing the nozzle into a solid cylindrical jet. A sea-valve 11 is fitted in the discharge pipe. A modification is described for use when the discharge pipe is horizontal, in which the sea-valve is between the ejector and the ash-valve; and a modified form of ash-valve is also described, comprising pockets in the circumference of the cylindrical part of the valve discharged by jets supplied from an axial pipe.

20,967. Ships. Cargo fittings. Comprises improvements in cleats or brackets of ships' cargo battens, specially of the kind described in Patent No. 12,841/94. The cleat is formed from a single piece of metal bent to the required shape. The arm *c* that carries the hook *d* engaging the hole in the frame is formed of a part which is bent downwards at

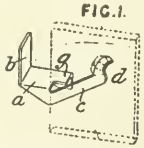


FIG. 1.

right-angles to the horizontal part *a*. The hook *b* is formed of a part bent upwards at right-angles to the part *a*. The claw *g* is formed of an extension of the horizontal part *a* and is bent downwards at the edge as shown, when used in conjunction with plain or bulb bars. When used with wide flanges or at the side of a flange, the horizontal part is extended to form a horizontal hook.

The Marine Engineer
And Naval Architect.
LONDON, MARCH, 1913.

INFLAMMABILITY OF SOME INSULATING MATERIALS.

FOR many years past considerable suspicion has been felt as to the inflammability, owing to spontaneous action, of some of the materials used for insulating purposes in cold storage equipments, and the investigation made by the National Physical Laboratory, at the instigation of Lloyd's Register, is a valuable addition to the interesting enquiry which was recently made by the latter body into the subject of the spontaneous combustion of coal on board ship. The research was placed in the hands of Dr. Rosenhain, than whom there could be no one more competent in view of his previous extensive work in this particular subject. The results of the experiments were set out in a paper read before the members of the Cold Storage and Ice Association, by Mr. R. Balfour. In the course of this paper it was pointed out that since the introduction of the larger type of frozen meat ship, attention has been continually drawn to outbreaks of fire which have occurred in insulated holds. It follows, in such cases, that the insulation has been burned, and when charcoal has been used as the insulating medium, it has been suggested and strongly held in some quarters that the fire was due to spontaneous combustion of the charcoal. After the fullest investigation there was no direct evidence that this was the case, but the suspicion having once been aroused, it follows, as it usually does, that although not proved guilty, charcoal was not accepted as innocent. Even the frequency of fires in non-insulated holds did not dispel the suspicion, and it is well that the matter should be submitted to a thorough investigation. Fires have occurred when pumice and asbestos have been used as the insulator, so that neither could be responsible, owing to their non-inflammability, and as it was the wood that was always burnt, it is somewhat remarkable that no steps appear to have been taken to render it non-inflammable, or at least non-ignitible. It must be remembered that wood enters very largely into a cold storage insulation, and in some installations as much as 300 tons of such material are used. Steps have been taken to prevent or mitigate decay of the wood by a process of impregnation, which must, of course, be inodorous in its effect, in order to satisfy the various interests which would be affected by cargoes becoming contaminated with any odour. It was thought advisable to include wood that had become decayed in use as a subject for investigation, as well as some specially prepared paper which is sometimes used between the wooden linings of the insulation. The first material dealt with was charcoal, in order to ascertain its absorptive properties with a view to determine whether spontaneous heating was set up when charcoal absorbed gas, and it was proved that at ordinary temperatures the air remained pure and did not combine with the carbon. It appeared that at all but extremely high temperatures the heating observed was entirely due to the absorption of air and not to chemical combination, and thus when the full quota of air had been absorbed by the charcoal no further heating could occur. It was not excluded that air-saturated charcoal might still have a capacity for absorbing other gases. It was thought that the wetting of charcoal caused it to give up its absorbed gases, so that on again becoming dry a fresh lot of air was absorbed and it would be in a condition to lead to spontaneous heating. Special experiments were therefore made, both with salt and fresh water, and it was proved that no danger existed when charcoal was thoroughly wetted. The experiment was carried out with a chamber which allowed a much greater diffusion of air through the charcoal than could possibly occur in practice, even with defective wood linings. The deduction from the experiments was that a temperature much higher than 230° F. would be necessary to start heating, even when the insulation was defective. The experiments with decayed wood and paper gave still higher results than charcoal. It is interesting to note that at the time the experiments were being conducted, a fire was reported as having occurred on board a vessel, the hold of which had been fumigated with Clayton gas, and it was suggested that the sulphur dioxide had been responsible for starting the fire. The matter was specially referred to Dr. Rosenhain, and a series of experiments were carried out in connection therewith, and the conclusion arrived at, that under certain conditions a 5% mixture of $S.O.^2$ and air could be made to produce spontaneous combustion in the charcoal. Previously, Mr. G. Nevill Huntley had been instructed by the Clayton Fire Extinguishing Company, Ltd., to investigate the matter, and arrived at the definite conclusion that wood charcoal cannot be set on fire by the action of Clayton gas. In view of this conflict of opinions we have carefully perused and considered the two reports and have come to the conclusion : that the conditions in the two cases were not analogous, and that you cannot deduce a result as to Clayton gas by an experiment on $S.O.^2$ mixed with air. The great difference lies in the fact that in the Clayton method the atmosphere of the chamber under treatment is being continually passed through the machine, the oxygen is gradually used up and a large percentage of nitrogen results. Again, the character of the charcoal employed in each case is worthy of some attention, and until this point has been cleared up, and in view of the inflammability of the charcoal being due to the chemical combination of $S.O.^2$ and oxygen, the matter cannot be by any means considered as explained on the basis of Dr. Rosenhain's experiments as far as Clayton gas is concerned.

REVERSING TURBINES

IT would seem that, judging from particulars which have been published recently in our contemporary, the *Shipping Gazette*, a considerable advance in turbine design has been made in the direction of obtaining equal efficiency and speed in both directions of rotation, without the necessity of any provision of special reversing blades or separate rotor. This departure, which is the invention of Mr. John Wilson, of Belfast, has the other important advantages of small volume, quick reversal and easy manipulation, and lastly, the capacity of being instantaneously reversed from the bridge by electrical means controlled by the captain or other officer in charge, should any special emergency require such action, for example, to avert a collision. The main feature is a rotatably mounted stator and a main rotor in a casing, which latter is stationary. If one realizes the point that the rotor revolves owing to the reaction of the stator, it will be seen that if these two elements be made to change places, then the original stator will as a rotor revolve in an opposite direction to that of the original rotor. The invention in question is, broadly, the provision of clutching and holding means by which either of the elements can be alternatively coupled to a driving shaft axially common to the two or held stationary relatively to the casing. It follows that in getting the above result a considerable amount of additional invention is involved in the specific construction of the two elements and their arrangement in the casing so that the motive fluid can be applied whichever element is the moving one. In effect, the means adopted comprise a fore and aft arrangement of clutch and brake mechanism at each end of the turbine, in such a way that the forward clutch and aft brake are associated with the main rotor, and the after clutch and forward brake are associated with main stator. The clutch is for coupling the element which is a rotor for the time being with the main shaft, and the brake is for holding the stator for the time being stationary to form an abutment against which the motive fluid re-acts. By the simultaneous action of the brake and clutch mechanism, one element can take up the drive in the reverse direction before the other element has finished revolving in its original direction. To do this it is not necessary to cut off the steam, and the interchange is effected without any shock. There is a variety of ways for effecting the operation of these controlling mechanisms, for example, by steam or hydraulic pressure, or by vacuum from the condenser, or by an electric motor and screw device. We understand that an experimental turbine of 100 horse power has been built and exhaustively tested with the most satisfactory results. It would seem at the moment that the Parsons type of turbine is the most applicable for the new system, but we have little doubt that the other systems, such as the Curtis, Rateau or Zoelly can be equally dealt with when the construction problems have been attacked and solved. We shall hope at an early date to return to this interesting departure, and give in greater detail the construction of the machine, and further information as to the constructive features by which the new result has been effected.

SHIPWRIGHTS' COMPANY

AT the moment of going to press we learn that Mr. Wynne E. Baxter, J.P., D.L., has resigned the clerkship of the Shipwrights' Company, which he has held for forty years. We understand this step has been taken owing to the Court of Assistants passing a resolution expressing their opinion that it was a disadvantage to exercise the office of clerk by deputy. It is, of course, well known to those who have had relations with the Shipwrights' Company that the actual duties of the office have been performed by an acting-clerk, and for many years this position was occupied by Colonel T. Davies Sewell (now Treasurer), whose association with the Company extends for upwards of forty-five years, and he has watched its growth from that of an organization of a social character to one which has of recent years become an effective force in ship craft. It is claimed, and rightfully so, that Colonel Sewell has been largely instrumental in securing, as members of the Guild, many men of mark, and his services in this direction are no doubt fully appreciated. The duties of acting-clerk have been carried out in recent years by Mr. H. W. Sewell, the son of Colonel Sewell, and we must bear our testimony to the courteous and business-like treatment we have always received from this gentleman in our dealings with the Shipwrights' Company. It is rumoured that some changes may be made in the administration of the Company, and we shall, in a future issue, notify what has been done if occasion requires. We trust that whatever changes may be made they will be to the benefit and prosperity of this Guild, which has such a promising future before it.

ENGINEERS AND NATIONAL INSURANCE.

THE Commissioners have decided that the senior watch-keeping engineers of mail steamers, that is to say the second, third and fourth, do not come under the Act for compulsory insurance, nor does the chief engineer of a general trading vessel, on the ground that the nature of their duties does not bring them under the manual labour clause. The value of board in addition to wages is reckoned at 2/- per day, but it is stated that in some steamers the rate may be reckoned at 1/6 per day. Comments have been made with regard to these ratings that it would be well if the food supplied to certain steamers, of which painful experience has been detailed, even approached this standard. And here one cannot but deplore the idea that unscrupulous persons should seek to enrich themselves unduly by robbing others of their legitimate food supply, and the signs are abroad that soon those who are guilty of such paring will be anathematised, as they richly deserve. This, however, by the way.

The Commissioners have further found that engineers junior to fourth come under the Act, also the chief refrigerating engineer and the electrician of mail steamers and the second engineer of a general trading steamer, the chief engineer of such being alone exempt. It seems rather curious that in detailing the duties of the second engineer of such a vessel the first point stated is that he keeps two watches! In what respect this differentiates him from the watch-keeping

engineers in vessels other than general traders does not appear. There are further duties in connection with his work which in the view of the Commissioners summed up together bring him under the Act. Among other questions occurs one which is somewhat pertinent to those who are now compelled to pay and, as they obtain promotion, drop out of it. Manifestly, the provision made should be announced, to indicate what benefits accrue to those who have been paying and suddenly are without the circle of payers and benefit-receivers. Especially does it appear that something should accrue to such from the funds when required to help in times of sickness and distress, as with promotion come family cares when sickness is more severely felt and involves the distress of dependents. The answer to those who have joined an approved society may be given by the officials of the society, and it would be well to have a clear statement on the subject.

THE ANTARCTIC EXPEDITION.

IN connection with the expedition which has, amid much regret, issued so distressingly, there are several points which may with profit be commented upon while the circumstances are still fresh in the memory. The general and specific details which have reached the public have been dealt with more or less fully in the press, and with more or less regard to imagination and accuracy. Later, when the vapouring tumult has subsided, and the vanity of the little mind has been satisfied by dwelling on the kinship of threads, we shall be able to study the connected narrative and derive melancholy satisfaction from reading the journal of Captain Scott and his companions. Meantime the lessons may be gathered up for service in our everyday life. It is well that every age of the world's history has produced men fired with the spirit of adventure and daring, to go forth to unexplored parts of the earth and mark the records of their discoveries, gaining at the same time that recognition from their generation which is a legitimate crown to all who labour strenuously and risk much for the uplifting of the nation or the advancement of knowledge.

It has been said that these ventures are commercial. Granting this to be so, there still remains the fact that no ordinary risk is taken and the results become the property of the public at a price which sometimes the adventurers have no share in receiving, save through those they leave behind. Enthusiasm and inspiration are necessary to carry into effect any great undertaking, and in the case of the explorers such are in evidence in the gathering of funds, and the helpers, who must be picked men, well disciplined and strong, so that, as far as possible, each link in the chain shall be of tested value. Unhappily, the giving way of one link proved fatal to the return of the party, and the spirit of self-sacrifice on the part of others was exercised in vain. It is interesting to note that 140 years previous to the date on which Captain Scott reached the South Pole (January 17th), Captain Cook entered for the first time within the Arctic circle.

Our sympathies are extended to Mrs. Scott and the relatives and friends of those who perished after attaining their goal.

SHIPPING REGISTRIES AND PROGRESS.

Lloyd's Register of Shipping.

THE Scottish staff of Lloyd's Register of Shipping held their annual dinner on February 2nd, at the St. Enoch Station Hotel, Glasgow, and the function, which is always a popular one, was on this occasion signalised by the presence as guests of an unusually large number of shipbuilders, engineers, shipowners, steelmakers, and others, with whom the surveyors of Lloyd's come in contact in their daily avocation, the company numbering altogether about 160. Mr. Edward J. Tierney, principal surveyor at Greenock, presided, and among the company were Mr. Charles E. Brightman, one of the chairmen of the committees on classification; Mr. F. C. Gardiner, chairman of the Glasgow Committee; Mr. David Colville, Mr. James Denny, Professor Archibald Barr, D.Sc., Professor of Engineering at Glasgow University, Mr. James H. Warrack, the Leith representative on the General Committee; Mr. T. J. Dodd, principal surveyor at Glasgow; Mr. John H. Heck, senior engineer surveyor at Glasgow, etc.

Dr. Archibald Barr proposed the toast of "Lloyd's Register," which was, he said, largely the toast of the shipping interests of Great Britain, and, perhaps, of the world. Dr. Barr then sketched the history of Lloyd's Register from its small beginnings nearly two and a half centuries ago, and declared that there was nothing more characteristic of the Society than the readiness and skill with which their requirements had adapted themselves to ever-varying conditions. The world, he thought, owed a great debt of gratitude to Lloyd's Register for the amount of work the Society had done in bringing the methods of testing iron and steel into the course of everyday work. Mr. Charles E. Brightman, who responded to the toast, remarked that by virtue of his connection with the classification committees he was in a special position to testify to the thoroughness with which the vast and important duties entrusted to the Society were discharged. There were building, or about to be built, at home and abroad to the classification of Lloyd's Register no less than 2,877,000 tons of vessels. Of this enormous total, which had been unapproached up to the present, over three-quarters of a million tons were in foreign yards, and this notwithstanding the fact that in countries abroad national registries were in existence which, perhaps, naturally, occupied privileged positions. During the year 1912 Lloyd's Register classed the record total of 1,403,000 tons, while the total classed during the existence of the Society exceeded 42,500,000 tons. At the close of 1912, 88 per cent. of the tonnage under construction in the United Kingdom for British classification was with Lloyd's. Speaking of the Clyde particularly, the position of the Society was indicated by the tonnage now under construction on the river. No less than 623,000 tons, or over 87 per cent. of the total under construction for British classification, was with Lloyd's Register. This great total included vessels of all types and sizes, from the huge Cunard liner *Aquitania* to the humble but most useful dredger and tug. Lloyd's Society had reached its present pre-eminent position as a result of high ideals unflinchingly pursued. It was strong enough to be impartial amid the conflicting interests of underwriters, shipowners and merchants.

Mr. Warrack, in proposing "Shipbuilding and Engineering," said that the cordial relations which had existed between the committee and shipbuilders and engineers had been strengthened greatly by the addition of ten or twelve of these to the committee. This arrangement would ensure that the rules and practice of the Society were kept abreast of all that was best in naval architecture and engineering. The Clyde and its shipbuilders and engineers had always occupied a foremost place in the high quality of their work, but if the Clyde was to maintain its reputation and its prosperity, its employers must be backed up by their workmen, not merely in the quality of their work, but also in the amount. In replying to the toast Mr. A. J. Campbell, of Messrs. Wm. Beardmore and Co., remarked that the whole range of industrial and commercial enterprise might be searched without finding a finer example of what mutual consideration of the interests of the buyer and the seller had achieved, while at the same time the safety of the great travelling public and the safe

carrying of valuable cargoes had been zealously guarded. This was due more to voluntary submission to carefully considered and self-enacted rules than to all the Acts of Parliament that could have been produced. Every shipbuilder and engineer would acknowledge that during the great period of expansion in shipping and the shipbuilding industry, he had always found Lloyd's Committee most considerate and progressive, eager to fall in with every new development and anxious to encourage improvements.

Mr. F. C. Gardiner, chairman of the Glasgow committee, proposed the supplementary toast of "The Staff." Whether at home or abroad, he said, the surveyors were often placed in extremely difficult positions, requiring at once a high degree of technical skill and the strictest integrity. Lloyd's surveyors, remarked Mr. Gardiner humorously, had to watch the steelmakers, the shipbuilders and the engineers, and sometimes even the shipowners. The owner required watching in bad times because he had no money to spend, and in good times because he was in such a hurry to make money that he would not lay his vessel aside to receive the necessary overhaul and repairs. This toast was responded to by Mr. T. J. Dodd, principal surveyor at Glasgow.

The British Corporation.

At the annual dinner of the staff of the British Corporation Registry, held in the Windsor Hotel, Glasgow, a week later, Mr. J. Foster King, chief surveyor, in responding to the toast of "The British Corporation," referred to the fact that no less than 330,000 tons of shipping had been built to B.C. classification during 1912, which had been a record year for the Society as well as for the shipping industry. The surveyors had been and still were responsible for the satisfactory completion of a fleet of ships comprising such variations that it seemed scarcely possible to find the practical solution of a large number of the structural problems which were to be found between the poles of their experience. That the committee were determined to adhere to their ideals of efficiency was proved by the fact that during the five years which had elapsed since their previous record year the surveying staff had been increased by no less than 33 per cent. The number of foreign names which appeared on the register during the past year was an expressive comment on the widespread support given to the Society, while the international character of its work was shown by the fact that one-third of last year's tonnage was for foreign and Colonial ownership. The loss of the *Titanic* in 1912 had had an enormous influence on the world of shipping, and he hoped that the effect on both popular and technical imagination of the overwhelming nature of the catastrophe would not obscure its true lesson. It had to be remembered that no practical system of sub-division could secure immunity from all disasters, and that no possible provision of life-saving appliances could provide safety after every disaster. The best safeguard for life and property was to avoid danger, and it seemed to him that stronger measures should be taken by owners, if not by legislators, to prevent unnecessary risks being incurred in navigation. It was not sufficient to deal with causes after effects. In his opinion there should be a higher standard laid down as to the margins to be taken, and navigators who sought to clear avoidable risks by knots, instead of by hundreds of knots, and chanced them at full speed, should be just as subject to punishment when nothing happened as when a ship and valuable lives were lost.

THE "FIRE KING" SPRINKLING SHOVEL.

In last month's issue reference was made to a shovel designed with a view to the better distribution of small coal into the furnace while firing. Information has now been received from the patentee, Mr. Clarence Fell, Fanshawe House, Dronfield, near Sheffield, to the effect that several shipping companies have been supplied with "Fire King" shovels. The stock sizes in which these are manufactured are: No. 5, 11½ in. by 13½ in., No. 6, 12 in. by 14 in., No. 7, 12½ in. by 14½ in., No. 8, 13 in. by 15 in., but any other sizes can be made and supplied to suit the requirements of customers. The cost of this shovel is rather greater than that of the ordinary type, but assurance has been given of its greater endurance, as well as of its economic value as a coal distributor.

THE MOTOR SHIP "ISLEFORD."

Largest Semi-Diesel Engined Vessel Afloat.

Great progress has undoubtedly been made by this country during the past twelve months in the building of Diesel engined ships, but quite as much, and possibly more progress has been witnessed in the direction of semi-Diesel or low compression residue oil installations. In powers up to 130 B.H.P. the semi-Diesel is a success and can be depended upon to stand up to its work under the most severe conditions. Above this power, however, we have had no experience and hence there are divided opinions as to whether semi-Diesels or Diesels proper should be employed for powers above 150 B.H.P.

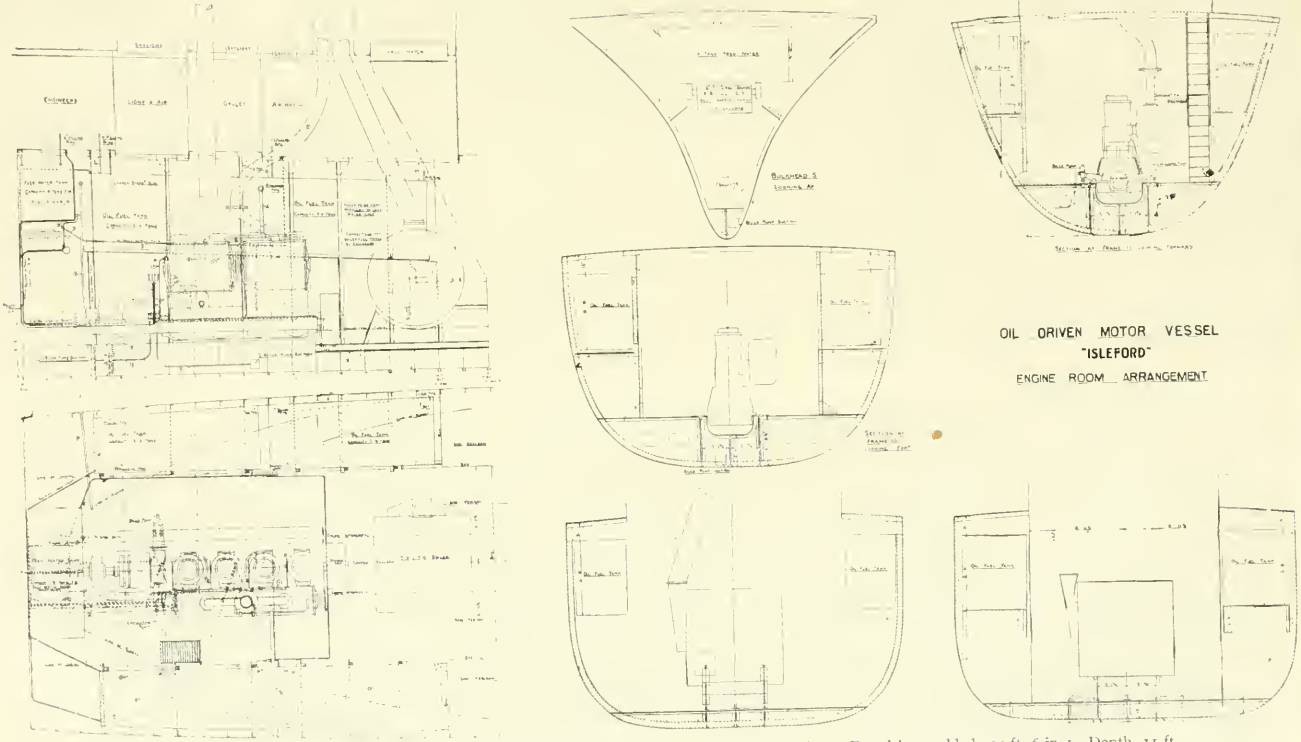
Accordingly a vessel of outstanding interest at the moment is the *Isleford*, which carried out most successful trials over the Skelmorlie measured mile on Thursday, 20th February. *Isleford* is not only the largest semi-Diesel engined ship built in this country, but nothing near her size fitted with this class of machinery has been put afloat from any yard on the continent. She was constructed to Lloyd's highest class by the Ardrossan Shipbuilding and Dry Dock Company, Ltd., Ardrossan, for Messrs. Mann, Ma Neil and Company, Glasgow, and will be used in the general coasting trade. Her dimensions are 149 ft. B.P.S. by 25 ft. 6 in. beam, mld., by 11 ft. depth, mld., and has a displacement on load draught of 780 tons. The engine contract was in the hands of Messrs. Douglas, Primrose and Co., Glasgow, the Scottish agents for the Bolinder's motor. At first sight the appearance of *Isleford* does not strike one as anything out of the common, except perhaps for the enormous hatchway, which gives great facilities for the handling of long length cargoes, such as rails, beams, etc., also one cannot say there is anything striking about her underdeck arrangement.

The deck accommodation consists of ample sized cabins situated aft, for chief and second engineers. The captain's cabin is situated forward at the break of the poop on the starboard side and on the port side is the mess room.

Regarding the deck machinery this is all steam driven and consists of two powerful winches at each end of the hatch, a heavy warping winch on the forecastle and a capstan aft. Steam steering gear is also fitted, the wheel being situated on the flying bridge.

The Propelling Machinery.

Coming to the most interesting part of the ship, *viz.*, the engine room, one is at once struck with the clean and light appearance, a difference from the machinery space of the typical steam coaster of this size. This apartment, as will be seen from the plans, is situated right aft and is entered from the poop deck just forward of the engineer's cabins. The main machinery consists of a four-cylinder Bolinder's direct reversible motor, developing 350 B.H.P. at 225 r.p.m. and consuming residue oil of a specific gravity of ·87. All the engine controls are arranged on the port side within easy reach of the man on watch and in close proximity to the telegraph, while coupled to the forward end of the crank shaft is a 4 in. bilge pump, working at the engine speed. As is well known the Bolinder's motor is of the now popular solid injection type. There is no cam shaft or intricate valve gearing, the fuel pumps, circulating water pump, etc., being driven from eccentrics at the aft end of the engine. Generally speaking the engines have a remarkably clean appearance and are what might be termed a sound heavy job. Forward of the engines and placed 'thwartships is a small donkey boiler, of the single ended Scotch type, with one furnace fitted with oil fuel burning apparatus of the Wallsend-Howden patent system, the fuel used being taken from the ship's main tanks. On the port side under the fuel tanks are situated a steam bilge and ballast pump interconnected with the bilge pump on main engine, a boiler feed pump and an oil pressure pump in connection with the boiler firing system, particulars of which we will come to later. The gases from the donkey boiler, as also the exhaust from the main engines are taken up a common funnel, on which is mounted an organ whistle and syren. The main requirements for the steam boiler are, of course, the deck machinery previously described. Twenty-five tons of fuel is carried in four galvanized tanks arranged two on either side of the engine. These are connected to a common service tank of

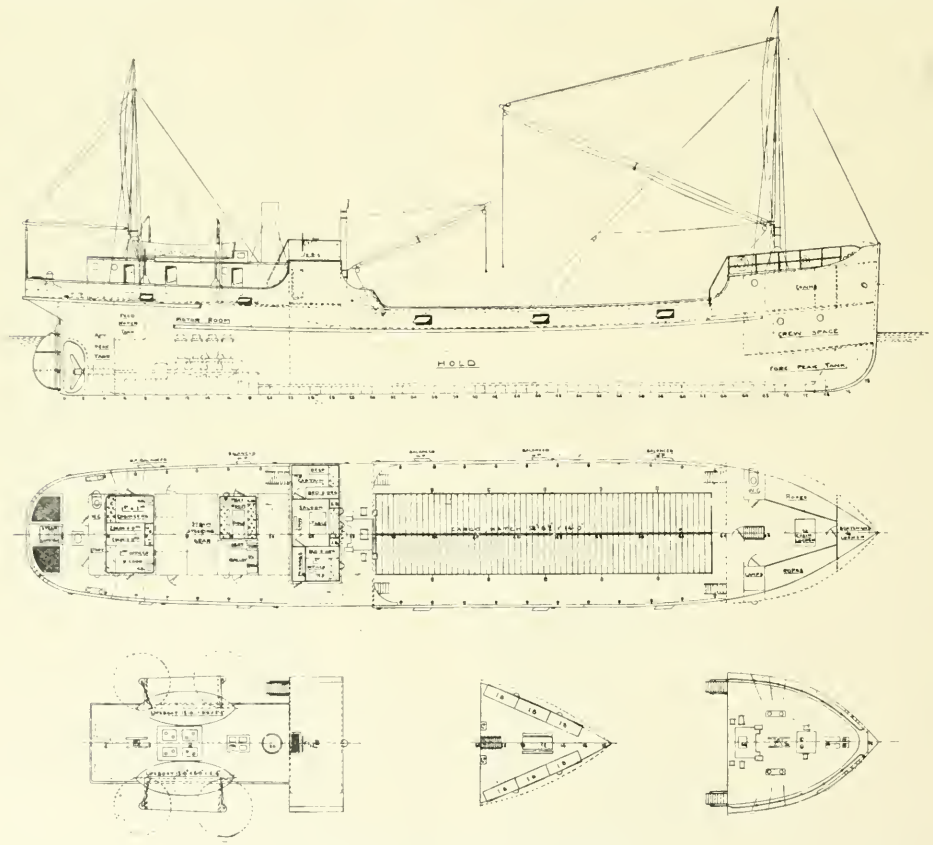


Oil-driven Motor Vessel *Isleford*. Engine-room arrangement: Length over all, 149 ft. 4 in.; Breadth moulded, 25 ft. 6 in.; Depth, 11 ft

150 gallons capacity on the outlet pipe of which there is a large gun-metal filter with four hand pumps mounted thereon for initial charging of fuel pipes, each coupled to the pumps on the main engine. A water tank for engine service is arranged right aft, having a capacity of four tons of fresh water. This, however, is larger than necessary, as one of the features of these Bolinder's engines is the light water consumption, in fact it has been proved by the 80 B.H.P. Scottish coasters *Innisdhu*, *Innisagra* and *Innisnee* that with a slight reduction in power the Bolinder's motor can be run for long periods without water. As is general with high powered heavy oil engines, starting is by compressed air and the air reservoir which is charged under normal conditions direct from the main engines is situated on the starboard side under the main fuel tanks. Should by any chance the air give out when the engines are stopped a small hand compressor fitted can be used for charging up.

Now as to the working of the engines, sufficient has already been written regarding the operation of these two-stroke cycle motors, and it will perhaps suffice to say that the starting and reversing is most reliable. Lamps are, of course, used for heating up and from cold the engines can be got under way in twenty to twenty-five minutes. The operation of the reversing gear is on the same principle as the smaller engines of this type; a remarkably neat device, however, is fitted, automatically throwing in the governing mechanism as the clutch is withdrawn, thereby preventing any racing of the engine. A short description of the oil firing apparatus on the donkey boiler may here be of interest. In this system the liquid fuel is injected into the furnace by means of a special oil-fuel pump. The oil is forced into the furnace in the shape of a conical spray of exceedingly fine particles, which burst into flame at a distance of six to eight inches from the nozzle.

For getting up steam an auxiliary apparatus is supplied which obviates the necessity of using wood, coal or other fuel, other than the oil itself, when raising steam in the boiler. This apparatus consists of a small auxiliary oil-heater, which is heated by means of a naphtha burner. A small independent hand-pump enables the oil to be pumped to the auxiliary heater, thence the oil passes through a duplex discharge strainer, and so to the burners. When sufficient steam is up to employ the steam oil pump, the hand-pump is put out of action and the oil is drawn from the oil tanks by means of a steam pump and thence delivered to the main steam-heated oil fuel heater, where it is heated to the required temperature. After leaving the heater the oil is filtered by passing through the Duplex discharge strainer, and from there it passes to the distribution valve box and thence to the burner. A circulating pipe is fitted between the distribution valve box and the pump suction, so that the apparatus may be kept working, and the oil heated without



Plans of the Oil-driven Motor Vessel *Isleford*.

necessarily working the burner. The air vessel being provided on the oil discharge pipe to maintain a constant pressure of oil. This fuel-burning arrangement, when correctly adjusted, is practically smokeless, and the fire tubes will not soot up; the boiler, in fact, will steam quite regularly for days together without any fluctuation in the amount of steam produced. Generally speaking, the whole engine-room arrangement presents the appearance of a well-thought-out job, and the engineers, Messrs. Douglas Primrose and Company, are certainly to be congratulated on the equipment and working of the machinery.

Regarding the speed trials, which, by the way, were of a semi-private nature, the vessel left Ardrossan, after loading up, at mid-day on the date mentioned and proceeded to the Skelmorlie mile. The weather was clear and calm. On a series of four runs over the mile a mean speed of 9·05 knots was attained, the engines running at 223 revs. per minute, or practically their designed speed, which was most satisfactory, considering that the guarantee was 8·5 knots. At the conclusion of the speed trials manœuvring tests were carried out, and these also proved very satisfactory, the vessel being brought from full ahead to a dead stop in 1 min. 50 secs. Altogether the ship was under power about seven hours.

At time of writing, it is the intention of the owners to have an eight-hours' full speed demonstration run, at the conclusion of which the vessel will leave for the Mersey with her first cargo. The oil used during the trials was Scotch shale of a specific gravity of ·87.

The *Isleford* is a vessel of more than usual note, and her performances will undoubtedly be watched with the greatest interest.

When the vessel was nearing completion, the owners decided to discard the derrick post ventilator at the forward end of the poop deck, and fitted a mast stepped in a tabernacle.

HARDWARE GOODS FOR SHIPS.

IN our last issue was noted a change which had occurred in the firm of Best & Bourne, Birmingham, by the retirement of the senior partner and in his place the introduction of his nephew, Mr. Hake. This firm has been long established, and has had considerable experience in supplying hardware goods to ships and steamers. There are several lines of steamers which have dealt with the firm for many years regularly, and recently orders were placed by the Royal Mail Steam Packet Co. for the steward's department outfit to be supplied to the five new steamers added to their fleet, the *Deseado, Demerara, Desna, Darro* and *Drina*. Situated in the Midland district, the firm is in immediate touch with many manufacturing companies, and is thus in a position to deal with orders promptly and advantageously for the stores used on board ship in each department. This firm has the sole agency for the "Daisy" oiler, which is specially adapted for quick-running machinery and is used largely in Admiralty ships where such a desideratum is appreciated.

AUSTRIAN CRUISER "NOVARA."

Saturday, February 15th, saw the launch at Fiume from the Danubius Shipyard, of the protected cruiser *Novara*, a sister vessel of the *Admiral Spaun*, launched in 1907, and the *Saida*, launched in 1912. The dimensions of the *Novara* are as follows:—Length, 125·2 m.; breadth moulded, 12·8 m.; depth to weather deck 4·6 m., and her displacement is 3,540 tons loaded. The water line is protected for four-fifths of the total length by special nickel steel plates of 60 mm. (2⅜ in.) thickness. The armament will consist of nine 100 mm. (4 in.) guns, two 47 mm. (1⅞ in.) guns, two maxims and two torpedo tubes. Parsons turbines developing 25,000 s.h.p. will give the vessel a speed of 27-28 knots; steam is produced from sixteen Yarrow boilers. The vessel will have a complement of 300 men, and is expected to be finished next winter at the same time as the sister ship "*J*" in construction at the same yard. All material for hull and engines has been supplied by Austro-Hungarian industries.

MARINE MOTOR NOTES.

WE referred in last month's notes to the experiences in connection with cracked cylinders and heads which apparently are primarily due to defective water supply, and are analogous to what happens to a steam condenser, the damage being caused not by the overheating but by the sudden contraction due to the rapid fall in temperature when the water is again put in service. As in a condenser, if the water supply fails, it is better to allow the overheated metal to cool off slowly before circulating again at the normal rate to prevent buckling of the tube plate or cracking the cast-iron shell, so in the motor sufficient time is necessary to equalize temperatures between the cylinder walls and jackets. It may be mentioned in passing that boiler crowns are not in exactly the same case, for it is obviously impossible to damp down the furnace at once, and water must be pumped in at the risk of buckling, a simple deformation being less serious than the bursting of the weakened plate.

The trouble experienced by some with the exhaust valves of the Diesel engine would appear to be in favour of the two-cycle type having no exhaust valve, but in general it is not usually sufficient to warrant radical changes in design. The eroding effect of highly superheated steam and the corroding effect in hot water pumps is similar to that which happens with the Diesel exhaust valve, pitting and scoring of the valves and seats to a depth of from an eighth to a quarter of an inch are reported, which may mean either unsuitable material, dirty exhaust gases or insufficient attention. The length of time the various valves will run without changing varies a good deal but averages at about four weeks for fuel and exhaust valves, by which time regrinding is necessary to keep them tight, or what is more usual renewal by spares kept ready ground. In this respect the exhaust valve suffers most, and it is something in favour of the two-cycle type that a valve is dispensed with in favour of a plain port in the cylinder, uncovered by the piston at the end of the stroke, scavenging being assisted by an air blast before the port is covered again on the return stroke.

At the present price of fuel oil the ten per cent. higher economy of the four-stroke engine is a consideration, although requiring considerably more engine space to obtain it. The fact that of the score of firms preparing to manufacture marine diesel engines only some three or four of this number have taken up the four-cycle type, would appear to indicate that the saving in space is worth more than the saving in fuel.

In consequence of a fire which occurred last September in an Aberdeen fishing boat, and into which an enquiry was held, certain recommendations have been made to the Board of Trade which provide for supervision of the installation of motors under some competent authority, issuing of instructions to the attendants, ventilation, oil leakage to the bilges, accessibility of all parts, fireproof engine compartments, fire-extinguishing appliances, and requiring at least an elementary knowledge of the engine from the attendant. It is desirable that some such regulations be adopted and a responsible authority appointed, always provided that no serious disability is placed upon what is besides being one of the most arduous of callings not altogether stable or remunerative.

Previous comments made regarding the motor coasting vessels around the Solent and the water ways leading inland have been recently emphasised in the continued enterprise which has characterised the traders and builders interested in such craft. The advent of the *Tally ho*, a vessel by Messrs. Crowther, which on her trials attained a speed of 10·5 knots, has been an event of the month. Several yachts are in course of construction to be fitted with motors, others formerly depending on sails alone are having motors installed as auxiliaries. Outfitting arrangements are in hand for the approaching season, while motor racing boats of the various types are being prepared for the courses in the Mediterranean and elsewhere. Another pilot service boat fitted with the Beardmore oil motor has recently been added to the fleet; it has been given the name of *Nab*.

The launch of another motor coaster named the *Inniseane*, at Kirkintilloch, during February, is the fourth vessel built by Messrs. MacGregor & Co. for the West of Scotland Motor Coasting Co., and the first of them to be engined by an Amsterdam firm with the Kromhout crude-oil engine.

MR. THOMAS MONK NEWELL.

MR. NEWELL has been appointed to the position of Engineer-in-Chief to the Mersey Docks and Harbour Board, in succession to Mr. Anthony George Lyster, who recently resigned the position in order to devote himself to consulting work.

Mr. Newell was born in Seacombe, Cheshire, and is the son of Mr. John Newell, head of the firm of Messrs. Monk & Newell, railway and dock contractors, of Liverpool, and is forty-nine years of age. He began his career in 1881 as a pupil of Mr. Fosbery Lyster. He remained in the service of the Dock Board for eight years. In 1889 he received the appointment of chief assistant engineer to the Hull Dock Co., afterwards becoming chief engineer. When the North-Eastern Railway absorbed the Hull Dock Co., Mr. Newell became chief dock engineer, and had control of the docks at Hull, the Hartlepools and Middlesbrough in 1900, which position he held at the time he received the present appointment. At these places he has had control of the expenditure of £3,000,000, chiefly in connection with the Hull Joint Dock.

While in Hull, Mr. Newell has had charge of the construction of the new entrance to the William Wright Dock, The Continental Riverside Quay and extensive alterations to the Victoria and Albert Docks.

Mr. Newell is undoubtedly one of the most able dock engineers of the time, and up to the present has been chairman of the River Improvement Committee of the Humber Conservancy Board. A scheme for the improvement of the River Humber is now in hand. Mr. Newell was responsible for the introduction of belt spouts for coal shipping in this country. These have been installed at the docks already mentioned, and are being extensively adopted in Wales.

For twenty-eight years Mr. Newell has been a member of the Liverpool Engineering Society; he is also a member of the Institute of Civil Engineers. As a member of the citizens' army he served in the Lancashire Rifles in Liverpool, and held the rank of captain before going to Hull. He retired from the East York Volunteers, after eighteen years' service, with the rank of Major.

DATA BOOK FOR SHIPBUILDERS AND NAVAL ARCHITECTS.

THIS data book, compiled by Pio Agapito, naval architect, and published by the Libreria Ettore Vram, Trieste, at 2s. 10d. post-free (in Austria 2s. 7d.), is a book of handy size for the pocket or the bookshelf, and is designed to serve the purpose of recording, in a systematic and compact form, the dimensions, capacities, scantlings, equipment, general arrangement, etc., etc., of vessels which naval architects or shipbuilders may have themselves designed and built, or of vessels produced by others, which may appeal to them as worthy of tabulating for future guidance. To the aspiring young draughtsman or designer, who makes use of such a means of committing to paper the essentials and the details of vessels which he may have had to do with, or which strike him as good examples to base future ships and engines upon, the little work specially appeals. The book consists mainly of a series of tables enumerating in neat type the various headings for particulars, and arranged with blank space for filling in the figures appertaining to each heading. The tables are compactly grouped according to subjects, and are exhaustive on each particular subject. Thus we have a table concerned with general dimensions, height between decks, light and load draught, etc. Another table schedules all the particulars regarding measurement, tonnage and the various ratios and coefficients connected with dimensions, displacement, draught, etc. Other tables deal with constructional features: frames, floors, beams, decks, etc., while provision is made for such other subjects as water ballast accommodation and arrangement; coal bunker arrangement; cargo spaces and capacity; cargo hatches; winches; windlass steering gear; boat accommodation; number of officers, crew, passengers, emigrants, etc. Special tables deal with matters affecting the displacement, trim, shape and stability of the hull, also the weights in hull and machinery and the coefficients based upon these matters. Other tabular matter refers to engines, boilers, propeller, electric light machinery and auxiliary machinery generally, while a further table provides for the recording of all particulars concerned with trial trips. From above enumeration it will be apt to be inferred that tables are spread over a large amount of space; but this is not so. So compactly are the tables arranged that the whole series for one vessel occupies only 2½ pages of the book. Leaving 1½ pages as blank space for supplementary notes, only four pages are required for each vessel of which record is taken. The book before us is a thin 8vo, bound in limp cloth, and serves for twenty vessels. The provision made for inserting the multifarious particulars is, perhaps, limited enough, and neatness will require to be exercised in filling in the figures. Compactness is attained very much through the use of ingenious abbreviations for technical terms and subjects, a very full list of which is given at the outstart. A second portion of the book is devoted to tables in which the "offsets" of the body plan of vessels can be filled in, and thus preserve an accurate record of the hull form. This feature, together with the list of abbreviations, enhance the value of this work as compared with somewhat similar data books for naval architects published in this country, which we have occasionally seen used. The publication of the present book should extend the practice of recording shipbuilding and engineering data.

Messrs. Suter, Hartman & Rahtjen's Composition Co., Ltd., during three months have supplied their "Red Hand Brand" composition to vessels aggregating 4,003,406 tons.

The Worshipful Company of Shipwrights.

At a Court held at De Keyser's Royal Hotel on the 30th ult., the Master (Mr. J. Bell White) presiding, the Right Honble. Sir Edward Clarke, K.C., P.C., was elected Master for the ensuing year, Colonel and Alderman Sir William Dunn, Senior Warden, Colonel Sir Philip Watts, K.C.B., F.R.S., second Warden, the Right Honble. Lord Allerton, F.R.S., third Warden, and Mr. T. L. Devitt, fourth Warden.

The Crest and Arms of the Worshipful Company of Shipwrights.

Sir Andrew Noble, K.C.B., F.R.S., was elected a member of the Court of Assistants and duly admitted. The following were admitted to the Freedom and Livery: — Sir Kenneth S. Anderson, K.C.M.G., Mr. E. H. Tennyson d'Eyncourt (Director of Naval Construction), Mr. W. J. Luke, Mr. A. W. Stewart, Mr. F. W. Lund and Mr. Saxton Noble.

Mr. Bernard F. Gribble, the distinguished artist, was appointed Marine Painter to the Company.

The following were elected Liverymen of the Company: — The Right Honble. Lord Devonport, P.C., D.L. (chairman of the Port of London Authority), Mr. John Glynn, Mr. Richard H. Green, Mr. Edward W. Green, Mr. C. C. Scott and Mr. H. B. Wortley.

The Master subsequently entertained the members of the Court at dinner.

In addition to those above-mentioned the Company included the following members of the Court and new Livery:—Earl Brassey (Past Master), Lord Merthyr, G.C.V.O., Viscount Hythe, Sir William White, K.C.B., F.R.S. (Past Master), Professor Biles, LL.D. (Past Master), Sir Joseph Savory, Bart. (Past Master), Mr C. E. Ellis, Mr. H. W. S. Baden-Powell, K.C., Mr. A. E. Hamlyn, Mr A. J. Fells, Mr. W. H. Patchell, M.Inst.C.E., Honble. Trevor Lewis, Mr. E. Perceval Clarke, Mr. A. Denny, LL.D., the Rev. A. R. Clemens (Chaplain) and Mr. H. W. Sewell (Acting Clerk).

The Master proposed the toast of "Our Sailor King," and subsequently in proposing the toast of "The Master Elect" he recalled a resolution of that Court dated the 20th February, 1880, expressing their congratulations "to their brother Shipwright Mr. Edward Clarke on the occasion of his recent election as a Member of Parliament." He felt very proud indeed that in handing over the reins of office in a few months it would be to a man so distinguished in his great profession and in public life as Sir Edward Clarke. He yielded to no one in his admiration, his high esteem, and he might say affectionate regard for the Master Elect. It was men like Sir Edward Clarke whose high conception of duty, whose sterling honesty of purpose in public life, who had put this country in its proud position and made it at once the admiration and envy of the whole world. He had heard it said by one entitled to speak with authority, that Sir Edward Clarke had been, as he now is, for a whole generation, the outstanding personality at the Bar of England; and in asking them to drink with great cordiality the health of the Master Elect and wish him success, he also expressed the hope that for many years to come Sir Edward would be at least one of the outstanding personalities of the Shipwrights' Company.

Mr. Perceval Clarke, in the temporary absence of Sir Edward, who was presiding at another meeting, said that he sympathized with those present in having to listen to him instead of to one whom he had always regarded as a master orator. It was difficult for him to stand in his father's place and respond to that toast. His father, though not a shipwright in the technical sense, had some qualifications for the office. At the age of thirteen he won a prize at school for a sectional drawing of a battleship of the 1854 type. The Master Elect had before him a difficult task, for he had to follow a Master who had brought to the office all those qualities which meant success to the Company, and in following Mr. Bell White he would have as difficult a duty to perform as had ever fallen to his lot. During his father's long connection with the Company his anxiety to be a good shipwright had never ceased, and when he came to occupy the chair, which was now so worthily filled, he felt certain that his father would endeavour to fill it with the same distinction as his predecessors.

Sir William White, in proposing the toast of the "New Livery," with which he coupled the names of Sir Andrew Noble, Sir Kenneth Anderson and Mr. Tennyson d'Eyncourt, said that it had been the policy of the Shipwrights' Company for the last thirty years (during which time he had been connected with the Company) to draw closer the ties between the Company and the shipbuilding, shipowning and related interests. He doubted whether in the City there was any Company which could show such a complete fulfilment of that policy, or so many members connected with the particular industry and interest the Company was supposed to represent. That was a matter of which this Company might well be proud. The names of the gentlemen they had to welcome that night were a proof of how well the principles laid down thirty years ago were still being put into effect. He mentioned first the name of his old friend, Sir Andrew Noble, who had honoured the Company by becoming a member,

Photo, Histed, Baker Street, W.

THE MASTER.

J. Bell-White, Esq., Assoc. I.N.A.

Photo by London Stereoscopic Co.

THE MASTER ELECT.
The Right Hon Sir Edward Clarke, K.C., P.C.

and who had that night been elected to a seat on the Court, and he sincerely hoped that the Company might have for many years his assistance in its deliberations. In Sir Kenneth Anderson there was no name which had a more distinguished position in the world of shipping; and in Mr. Tennyson d'Eyncourt they had the recently-appointed Director of Naval Construction to the Admiralty. When he (Sir William) joined the Company he used to hear a great deal about Phineas Pett, who, at one time, it was said, had been Master of the Company. But he did not think that they need go back to the 17th century to refer to great naval architects, as they had with them to-day, and present in that room, Sir Philip Watts and his successor, Mr. d'Eyncourt; and he congratulated the latter on having before him, he hoped, a long and distinguished career. This Company had kept alive the principle of heredity by patrimony. They had admitted that night Mr. Saxton Noble, the son of Sir Andrew Noble, and Mr. Lund, a name well-known in shipping circles; also the Honble. Trevor Lewis, the son of Lord Merthyr, a member of their Court.

Photo Jas Bacon, Newcastle.

E. H. Tennyson D'Eyncourt, Esq.,
Director of Naval Construction to the Admiralty.

Photo, Elliott & Fry.

Sir Andrew Noble, K.C.B., F.R.S.

Sir Andrew Noble, in responding, said that he well remembered the launching of the *Great Eastern* about fifty years ago. A great fuss was made about her at the time as she had a tonnage of 12,000 tons displacement. But when they came to compare her with the vessel launched the other day at the Elswick Works, the ultimate tonnage of which, when completed, would be 30,000 tons, they saw at once the enormous strides that had taken place in shipbuilding during the last half-century.

Sir Kenneth Anderson said he was a shipowner and a shipwright by heredity. Many of the early shipowners were merchants, if they were not pirates or filibusters, and that, he imagined, explained why there had not come down from the past any City Company of Shipowners. In the future the race would be to the nation that was the best equipped in scientific knowledge; therefore there was need for educational effort, and if as a member of the Company he could be of any use in promoting that object he would be well satisfied.

Mr. Tennyson d'Eyncourt said that he was in a very difficult position through having to succeed as Director of Naval Construction two such brilliant men as Sir William White and Sir Philip Watts. He could only hope that a small portion of the cloak of their wisdom might fall upon his shoulders.

The Master, in proposing the toast of "The Marine Painter to the Shipwrights' Company," said that that was a toast that hitherto had been unknown to that Company. He was quite sure that Mr. Bernard F. Gribble would be a great acquisition to the Guild. In addition to his being a distinguished marine painter he was also a great portrait painter, and, as such, a keen student of human nature. After responding to the toast no doubt Mr. Gribble would tell them some of his amusing experiences, and he would ask him to sketch for them something in black-and-white.

Mr. Gribble, in responding, said that it was one thing to paint a ship or a historical naval subject, and another thing to make a speech. Before sitting down he told some amusing stories arising out of his experiences as an artist, and made a clever drawing of a destroyer under full steam.

The toast of "The Master" was proposed by Sir Edward Clarke, who had meanwhile entered the room. He did not find that toast on the list, but without it their proceedings that evening would be incomplete. His own election to the Chair gratified one of the great ambitions of his life—to be a Master of a City Guild; but as he came to realize the amount of time and care it was necessary to give to the work of the Company he became increasingly doubtful as to whether, when his term of office came, he should fulfil the expectations of his brethren. The fact was that during the current year they had had in their present Master an admirable and devoted member of the Shipwrights' Company,

who, with great energy, with great capacity, with great acquaintance of public men and affairs, had given all that he had of time, of energy and capacity to the work of the Company. He had been a member long enough to have seen great changes in the Shipwrights' Company. He confessed, however, that comparing its position now with its position when he first became a member of the Livery some thirty years ago, the change was remarkable. As the great shipbuilding industry of this country had increased and developed, the Shipwrights' Company had more than kept pace with it, and to-day they had on their Court and on their Livery men who on all hands were recognised as the great exponents of the shipwrights' art. He desired to pay his personal acknowledgments to the Master for the time which he had given to prepare him for the duties of the office, and he really felt doubtful whether he should be able to act up to the high standard of service which the Master and his predecessors had set; but it would not be his fault if he failed to do his duty to the Company. He was sure that every member would join in acknowledging that the present Master had thoroughly fulfilled the duties of the office.

The Master, in responding, said that it had been a great and unexpected pleasure to listen to that most charming speech from the Master Elect. If there had been during his year of office any success at all achieved in connection with the Company he did not think it had been due to him, but due to a certain extent to a chain of fortuitous circumstances. He might perhaps have originated some of them, and having had such brilliant predecessors in office, he was spurred to effort, but he had been able with very great confidence to discharge his duties feeling that he had them behind him and could go to them at any time for advice and support; and much was due to the advice and kind encouragement which he had received from his Wardens, and especially from the Master Elect.

It had been a great gratification to him during his year of office to keep up cordial relations between the Institution of Naval Architects and the Shipwrights' Company. That Institution represented all the scientific thought of the Shipwrights' profession, and, on the other hand, the Shipwrights' Company represented the social side, and also contributed to the charitable and educational work connected with the craft; in fact, it was probably owing to the valuable

Photo, Histed, 42, Baker St., W.

Bernard F. Gribble, Esq.
Marine Painter to the Worshipful Company of Shipwrights.

scheme of education started by his friend Sir William White that he occupied the position of Master that night. It was a scheme that any man might be proud to be identified with, and to give all the time and money to it that he could spare. He hoped that more money would soon be found for both these excellent objects. The motto of their Company was "Within the Ark safe for ever," but that did not mean that when once anyone was admitted to the Ark they were to fold their hands and do nothing. They ought rather to take as their motto the words of a celebrated American divine:—

"Look upward and not downward;
Look out and not in;
Look forward and not backward;
Lend a hand."

If everyone in the Company would lend a hand they would very soon become much more powerful than they were at the present time.

When they came to consider that it was the craft which they represented which had enabled England to build up the mightiest Empire ever known by the skill and ingenuity of her shipbuilders, the enterprise of her shipowners and the intrepidity and loyalty to duty of her seamen, it was most remarkable that their Company was not even one of the twelve great Companies of the City of London—it stood something like sixtieth on the list of the smaller Companies. It ought not only to be one of the twelve great Companies, but the first of the twelve; and he hoped that every member of the Company would "lend a hand" to put it in that proud position.

There was an admirable programme of music arranged by Mr. Reginald Groome, and Mr. Bernard Gribble presented each guest with a copy of the Prince of Wales' Christmas card, the subject of which is "The Armada sailing for England." The card had been designed for the Prince of Wales by Mr. Gribble and reproduced by the gracious permission of His Royal Highness.

Reproduction of painting by Mr. Bernard Gribble on the Prince of Wales' Christmas Card.
(By permission from the original Christmas Card, reproduced by Messrs. Raphael Tuck & Sons, Ltd., for H.R.H. The Prince of Wales.)

Those who may be desirous of subscribing regularly to this journal, but who may be deterred from doing so by travelling from place to place, are reminded that the publishers make special provision to get copies into subscribers' hands regularly and promptly in whatever part of the world they may be.

Oil Fuel for Marine Engines and Boilers.*

By Mr. C. ZULVER.

So much has of late been said and written on the use of liquid fuel as a source of power and of its advantages over coal that it appears to be difficult to express any original view on the subject. The ground has been already well traversed, but daily the importance of liquid fuel grows, both for shipowners and for the users of power on shore who are on the *qui vive* for improved and more economical methods. Hence the justification for the contents of this paper.

It may be explained beforehand that the writer does not propose to put forward any views of a speculative nature, and that on this occasion he wishes only to deal with facts gathered from actual experience. Thus, it is hoped, they will be of practical value to enterprising shipowners and other users of power meditating the adoption of oil fuel for either steam raising purposes or direct power production on pistons of internal combustion engines of Diesel or other type.

The writer proposes to deal in rotation with the following subjects bearing on actual results obtained from the use of oil fuel on board ship :—

1. Comparison of fuel consumption in oil and coal on steamers and the bearing on cargo-carrying capacity.
2. The institution of a very similar comparison between steamers and vessels fitted with Diesel engines.
3. Risk of burning and carrying oil fuel as compared with coal.
4. Reliability in actual service of coal and oil-fired ships and speed results obtained.
5. Various systems for burning liquid fuel.

In comparing the fuel consumption of oil and coal-fired boilers and all steam-engine plants on board ship, the consumption is, in most cases, given in I.H.P. per hour, and the following figures have appeared in certain publications for natural or forced-draught fired boilers and ordinary triple-expansion engines :—Consumption of oil per hour per I.H.P., 1·02 lbs., 0·95 lbs., etc. These figures are to be considered very economical if compared with the usual consumption of coal, being from 1·5 to 1·6 lbs. per 1 H.P. per hour ; but in the writer's opinion, they do not quite give a true idea of actual results obtained, *i.e.*, fuel consumption in relation to work done.

Fuel consumption per I.H.P per hour being a recognised standard for comparison and exclusively adopted, some explanatory observation in support of this view may not be out of place. The writer has found that the I.H.P. as calculated from the cards may vary greatly for the *same revolutions*, in consequence of internal losses in the engine itself as influenced by different settings of slide valves, various arrangements of driving auxiliaries, etc., and it would therefore appear that with these varying conditions on board steamers, I H.P. per hour cannot quite be accepted as a true basis for comparison. It may also be observed that it is largely a theoretical basis, as the working out of a small indicator card easily allows of mistakes being made on either side. And a slight mistake either in taking a card with gear which is not of modern design—in very few ships it is—or in the subsequent calculations from the card, easily makes it possible to arrive at varying results. It has, for instance, been found that where in the one case the fuel consumption per I.H.P. amounted to 1·25 lbs., the actual result in speed and fuel consumption per day for the same displacement was considerably better than when the consumption worked out at 1 lb. per I.H P. per hour, and that the I.H.P. on paper (*i.e.*, on the cards) is by no means to be looked upon as giving a fair idea of the true power transmitted to the propellor.

The average shipowner does not care very much for theoretical figures ; naturally, he is, as a rule, more interested to know the consumption of coal or oil fuel per diem in connection with deadweight and speed maintained. These figures define the fuel bill, which he is anxious to keep as low as possible, so that his ship may make a favourable showing in comparison with competitors.

These few remarks will be sufficient excuse for deviating in the following pages from the general rule of giving fuel consumption in I.H P. per hour.

From a number of voyages of the same ship with the boilers burning either coal or oil, and the engines kept running as nearly as possible in the same condition as regards vacuum, revolutions, etc., it has been found that in a ship with deadweight carrying capacity of 7,700 tons, the consumption of oil works out over a series of years at about 22¾ tons a day against 32/33 tons of Welsh coal, or a mean saving, by weight, in fuel consumption of 33 per cent As a direct consequence of this, it was found that the ship carried about 150/200 tons more cargo, when burning oil. The actual results obtained in the steamer *Conch* under these conditions, as copied from the vessel's log, are given.

Extract from Log of S S. "Conch."

LIQUID FUEL.

Day.	Voyage.	Hours Steaming.	Miles.	Revs. per Min.	I.H.P.	Speed	Cons.
1912.	Feb. 10th to Mar. 19th.						
Feb. 12	Samboe to Rotterdam Fore 25′ 0″	24-18	275	63	1561	11·3	22·5
,, 13	Draft Aft. 26′ 3″	24-19	284	63		11·7	22·5
,, 14		24-17	252	63		10·4	22·5
,, 15	Cargo 6,833 tons Ben.	24-17	252	63		10·4	22·5
,, 16	Deadweight 7,902 tons	24-16	242	63		10·0	22·5
,, 17		24-15	241	63		9·9	22·5
Mar. 16		23-48	238	65·3	1763	10·0	22·5
,, 17		23-46	225	63		9·5	22·5
,, 18		23-27	240	63·3		10·2	22·5

COAL. Welsh and N. Country.

Day.	Voyage.	Hours Steaming.	Miles.	Revs. per Min.	I.H.P.	Speed	Cons.
1910 Mar. 27	New York to B. India. Fore 23′ 7″						
	Draft Aft 27′ 5″	23-45	230	63·7	1670	9·7	33
,, 28		23-45	233	63·2		9·8	32
,, 29	Cargo 6,827 tons Ker.	23-45	226	63·4		9·5	32
,, 30	Deadweight 7,761 tons	25-45	235	63·5		9·9	32
,, 31		23-47	217	62·9		9·1	32
Apr. 8		23-50	237	63·2		10·0	31
,, 9		23-50	230	63·5		9·7	31
,, 10		23-51	222	63·0		9·3	31
,, 11		23-50	243	63·1		10·2	31

With regard to the speed attained by a ship consuming liquid fuel in comparison with a coal-burning boat, it has been found that an appreciably better speed is maintained by the oil-fired steamer. This is mainly attributable to the cleaning of fires being dispensed with and also to the fact that in the Tropics, and when coming through the Red Sea, the full steam pressure is constantly maintained with the oil fuel, the boilers being fired mechanically, while in coal-fired ships considerable difficulty is often experienced in keeping up steam with a temperature in the stokehold of from 115-125° F. In summer in the Red Sea an even higher temperature is quite common. These conditions, coupled with the fact that in some ships an inferior quality of Indian or other description of coal is carried, make it clear that the advantages of liquid fuel are considerable and usually underestimated by those without actual experience of its use. Even in temperate climes, it has been found that the ships burning liquid fuel show much better results as regards speed in relation to consumption and upkeep of boilers, stokehold and bunkers. A further important factor is that no skilled firemen are required in ships burning liquid fuel. The installation, when placed in the engine-room, can be controlled by the engineer on watch, and requires no more attention than ordinary independent feed pumps, while one fireman can easily attend to eighteen furnaces.

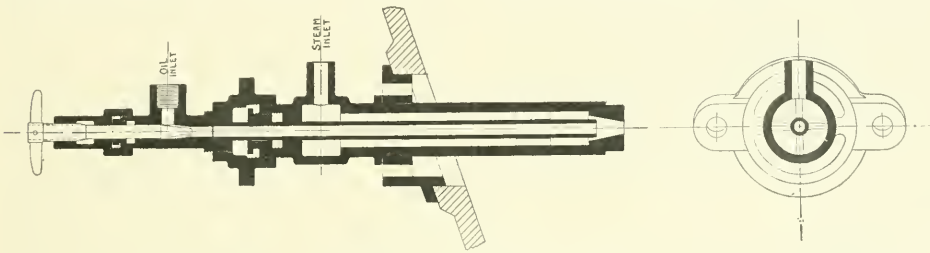
* Read before the Institute of Marine Engineers on February 24th.

In comparing the enormous advantages derivable from oil fuel in conjunction with the Diesel ship with the use of coal in ordinary steamers, the following figures, obtained in actual working, the mean result of two years' running, may be found of interest. We propose to give a few comparative results obtained with the motor vessel *Vulcanus*, which commenced service in February, 1911, and a steamer of slightly less carrying capacity, thus :—

	Vulcanus.	S.S. *Sabine Rickmers.*
Length, B.P.	196 ft. 0 in.	200 ft. 0 in.
Breadth	37 ft. 9 in.	30 ft. 6 in.
M.D.	13 ft. 2 in.	18 ft. 9 in.
Draught, S.M.	12 ft. 4½ in.	16 ft. 9 in.
Block co-efficient	·78	—
Deadweight carrying capacity	1,235 tons	1,269 tons
Displacement	2,080 tons	2,290 tons
Mean speed	8 knots	8 knots
Engines (6 cyl. 4-cycle, reversible Werkspoor Diesel, dia. 15¾ × 23⅝ ins. stroke)		Dias. 17⅜ × 28 × 44½ ins. 27⅜ ins. stroke.
Revs. of engines	160 per min.	80 per minute.
Consumption per diem	2 tons of oil	11 tons of coal.
Total number of staff and crew	16	30
Vulcanus has European crew, cost per day		£6 6 5
Sabine Rickmers has Chinese crew, cost per day		£9 0 7

With regard to the fuel consumption of the *Vulcanus*, this, as will be seen above, has not been found to exceed two tons of solar oil per diem, or about one-fifth of the coal consumption of a steamer of like capacity. A striking example of the advantages associated with low fuel consumption is to be found in the fact that the vessel recently completed a voyage of eighty-eight days without bunkering at any intermediate port. On this particular run she left Amsterdam on 30th August with 140 tons of fuel oil bunkers, loaded a cargo at Constanza, Black Sea, for Cette, proceeded thence to Batoum, and arrived back at Amsterdam on 27th November, a distance of some 10,750 miles. In the Bay of Biscay and North Sea, moreover, the *Vulcanus* was confronted by very bad weather Nevertheless, six tons of liquid fuel remained on board at Amsterdam after the voyage. Thus the total consumption was 134 tons in 65·7 steaming days, or 2·03 tons per diem. Having discharged cargo at Amsterdam, the *Vulcanus* was dry-docked and the engines opened up and cleaned Beyond a few piston rings no renewals were found necessary, and, after cleaning up, the vessel left Amsterdam on 19th December on a similar voyage.

It is particularly satisfactory to be able to record that, so far, there has been no appreciable wear and tear of the engines, a fact doubtless attributable to the excellent material the engine-builders put into the construction of the machinery. The wear and tear of cylinder liners, as ascertained on last occasion, is shown by the following figures :—



A simple type of Steam Liquid Fuel Burner.

Extracts from the logs of both vessels are given, showing how fully have been realized the claims made for Diesel engines as regards economy in fuel consumption, etc.

Extract from Log of M.V. "Vulcanus."

Day.	Voyage.	Hours Steaming.	Miles.	Revs. per Min.	I.H.P.	Speed	Cons.
1911	Aug. 3rd to 26th.						
Aug. 5	Kustendje to Hamburg	22-34	177	172		8·0	1·95
„ 6	Fore 11′ 2″						
	Draft	21- 2	165	172		8·0	1·87
	Aft 12′ 8″						
„ 7		21-33	174	172		8·1	1·82
„ 8	Cargo 976 tons	23-45	189	172		8·0	1·98
„ 9	Deadweight 1,112 tons	24-15	183	172		7·5	2·02
„ 10		24-15	184	162		7·6	2·02
„ 11		24-14	174	162		7·2	2·02
„ 24		23-46	188	170		7·9	1·98
„ 25		12- 5	96	170		8·0	1·00

Extract from Log of S.S. "Sabine Rickmers."

Japan and P. Laut Coal.

Day.	Voyage.	Hours Steaming.	Miles.	Revs. per Min.	I.H.P.	Speed	Cons.
1912	April 22nd to 30th.						
Apr. 22	Pladjoe to Saigon, via Singapore	8-40	86	85·5	520	10·0	5·0
„ 23	Fore 15′ 7″						
	Draft	19-59	174	85		9·1	11·0
	Aft. 16′ 5″						
„ 27	Cargo 1,033 tons	23-55	208	86·1		8·7	13·5
„ 28	Deadweight 1,200 tons	23-58	212	86		8·8	13·5
	June 20th to 27th.						
June 22	B. Pappan to Bukum, via P. Laut	19-50	161	84·5		8·1	11·1
	Fore 14′ 3″						
„ 23	Draft	24-14	209	85·3		8·6	13·5
	Aft. 16′ 3″						
„ 24	Cargo 1,013 tons	24-10	201	83·5		8·3	13·5
„ 25	Deadweight 1,225 tons	24-12	222	84·1		9·2	13·5

Gauging of Main Motor Cylinders, December, 1912

	Top.	*Middle.*	*Bottom.*
Original size	400 mm.		
No. 1	400·5 mm	400·4 mm.	400·1 mm.
No. 2	400·6 mm.	400·4 mm.	400·1 mm
No. 3	400·8 mm	400·6 mm.	400·6 mm.
No. 4	400·7 mm.	400·4 mm.	400·05 mm.
No. 5	400·6 mm.	400·4 mm.	400·2 mm.
No. 6	400·4 mm.	400·3 mm.	400·15 mm

These results are considered extremely good, and there is every reason to conclude that the cost of upkeep of a Diesel engine will be less than that of a steam engine and boiler plant, expense of maintenance of boilers particularly increasing as age advances.

The *Vulcanus* has now covered 45,600 miles, more or less, and her engines are estimated to have made over twelve millions of revolutions. Her cargo-carrying capacity actually shows itself to be some 12-15 per cent. more than on a steamer of equal dimensions, which circumstance is due to the greatly reduced weight of the bunkers carried and the lower weight of the machinery, so that, with the high freights now ruling, the earning capacity of the vessel is much in excess of a steamer of like size. As a matter of fact, reckoning on present advanced rates of freight, this advantage has been found to represent about £2,500 a year, which in a ship of these dimensions is a considerable sum, and it must be borne in mind that these statements are in no way hypothetical, but rest on a prolonged and even exhaustive experience. Nor have we touched upon the whole of the important advantages which the Diesel ship enjoys over the steamer.

To set down those not easily reducible to figures, it may be stated that with the Diesel ship standby losses in port show at a minimum, while, with the coal-burning steamer the

amount of fuel consumed lying with the banked fires is considerable. The maintenance of boilers, again, as all engineers know, is a costly matter. The expense, too, has a tendency to grow with their age. In the not infrequent necessity of repairing boilers during a voyage much time is lost in waiting until the boilers have cooled down sufficiently for work to be started and again lost in getting up steam. The greatest advantage of the Diesel vessel, next to a very low fuel consumption, is, perhaps, the absence of boilers with its corollary of saving in weight and space, and, as already mentioned, greater cargo-carrying capacity and fewer firemen. Briefly, to recapitulate the position :—

A The deadweight carrying capacity is from 12 to 17 per cent. more.

B. Smaller size of ship for a particular deadweight ; hence lighter expense.

C Size for size, the liquid fuel bunker will take the vessel five times as far as the coal bunker—a great desideratum in both the man-of-war and the merchant ship—and otherwise useless spaces, such as fore-peak double bottom, etc., can be utilized for its storage.

While this article was in course of preparation another motor vessel—the *Juno*—started her career in the transport of petroleum. After satisfactory trial runs, the craft left Rotterdam on 22nd November, bound for Braila, in the Black Sea, where, after a prosperous passage, she arrived on 15th December. Having loaded a full cargo of oil, the return voyage was commenced on 22nd December, after having been seven days in port to examine piston rings, etc. and beyond a few piston rings being found stuck fast, everything was in good condition. The total fuel consumption for all purposes, excluding port use, worked out at 86·21 tons, or 4·75 tons per diem, which, for a displacement of 4,200 tons and a mean speed of 9 knots, may be considered eminently satisfactory.

An extract from the log of the M.V. *Juno* is here given.

Date.	Voyage.	Hours.	Miles.	Revs.	I.H.P.	Speed	Cons. incl. auxls.	Main Motor Cons.
1912								
Dec. 23	Braila to Hamburg	1- 0	8	112		8·0	·72	·17
,, 24	Draft 17′ 5″ fore 19′ 0″ aft.	24- 2	199	108		8·27	4·85	4·10
,, 25	Cargo 2,248·66	23-52	204	108.		8·54	*4·85	4·10
,, 26	Deadweight 2,513 tons ..	23-51	229	115.5		9·64	4·90	4·15
,, 27		23-37	208	114·3		8·81	4·85	4·10
,, 28		24-16	195	113·9		8·03	4·90	4·15
,, 29		23-16	213	120		9·15	4·90	4·15
,, 30		21-46	206	119·5		9·47	4·55	3·80
,, 31		24-19	228	118	1323	9·38	4·95	4·20
1913								
Jan. 1		24-19	222	117·7		9·13	4·95	4·20
,, 2		24-18	222	119·6		9·13	4·95	4·20
,, 3		23-51	216	116·7		9·05	4·85	4·10
,, 4		23-21	197	113·6		8·43	4·75	4·00
,, 5		23-54	197	111·7		8·24	4·75	4·00
,, 6		22-55	205	114·3		8·94	4·60	3·90
,, 7		23-44	222	116·8		9·35	4·85	4·10
,, 8		23-41	212	115·4		8·94	4·85	4·10
,, 9		22-49	204	115·3		8·94	4·65	3·90
,, 10		8-30	81	112·1		6·00	4·25	1·45

The *Juno* left Rotterdam for Braila on the 22nd Nov., 1912, with 217·66 tons bunkers. She took 26·56 tons bunkers in Braila and arrived back in Amsterdam on the 13th Jan., 1913, with 48·85 tons oil remaining. The consumption for all purposes amounted to 195·37 tons ; deduct from this, port and Danube River consumption, amounting to 19·37 tons, we find that she consumed 176 tons in full sea, including all auxiliaries, or 4·92 tons per day of twenty-four hours. Her main motor alone consumed 148 tons or 4·14 tons per day of twenty-four hours.

It may be mentioned that the auxiliaries in the *Juno* are driven by steam. The donkey boiler is fired partly by the exhaust gases of the main motor and partly by liquid fuel directly injected into the furnaces. It was found that the heat contained in the exhaust gases was not quite enough to keep up full steam at sea, and occasionally the burners had to be used.

The fuel consumption of main engines worked out at 0·3 lb. per I.H.P. per hour. This figure is exceptionally low, but the author believes that it would hardly be fair to the steam engine to use it for the purpose of comparison ; for, particularly in the case of the Diesel engine, a good portion of the horse-power is lost in the engine itself through the driving of air-compressors, etc. The author's experience and investigation show that at least 30 per cent. should be deducted and in small engines up to 35 per cent. to arrive at the B.H.P. Allowing for a difference of 30 per cent., the consumption for the main engines of the *Juno* works out at 0·43 lb. per B.H.P. per hour, and the total consumption, including all auxiliaries, at 0·40 lb., which is about 17 per cent. less than for the two-cycle engine.

It is now desired to place before you a set of cards taken by the Chief Engineer on the run from the Black Sea to Hamburg.

Before turning to the subject of the use of liquid fuel under steam boilers, where in existing and projected tonnage it has also a promise of ever-extending adoption, something should be said concerning the mechanical difficulties experienced in running Diesel engines at sea. From over two years' practical association with the subject, the writer is of opinion that, as regards the four-cycle Diesel engine, no deviation from satisfactory and continuous running need be apprehended in the different phases of the weather. The four-cycle Diesel engine has functioned admirably in long non-stop runs, and a small Diesel ship, the *Sembilan*, performed a non-stop voyage from Aden to Sabang—some 3,600 miles—in the beginning of 1911. The *Vulcanus* has made lengthy continuous trips under severe meteorological conditions, and it may be recalled that she was in the Bay of Biscay during the destructive gales that were a feature of the Christmas season. In both this and last winter, as a matter of fact, the *Vulcanus* has successfully combated such storms as establish beyond argument the reliable qualities of her propelling equipment.

The plain unvarnished truth is that the engines gave very little trouble indeed, wear and tear of moving parts being very slight and less than is usually found in marine engines. In the commencement a difficulty was experienced with the cooling pumps, through the capacity having been based on land practice, and proving insufficient. This was remedied by the addition of a small centrifugal drive by noiseless chain from crank-shaft. The air-pumps were the real trouble, and they broke down several times before a satisfactory design was hit upon. Nevertheless, the vessel was always able to reach port safely and to proceed at full speed by means of the auxiliary Diesel engine driving the air compressor ; it may here be stated that the *Vulcanus* has no donkey boilers and is entirely dependent on motor power.

The exhaust valves, which are usually looked upon as a weak point in the four-cycle Diesel engines, have given no trouble on the *Vulcanus*, although the precaution was taken to grind them in, or put the spare valves in after about a fortnight's or three weeks' running, the old valves with their seats then being ground in again at sea. No inconvenience or delay has ever been caused in this respect, it being quite an easy matter to fit a set of spare valves and seats.

To record the further mishaps that have befallen the *Vulcanus*, it should be stated that on her third voyage to Hamburg the brick lining of the exhaust pipe collapsed, thus partially choking the exhaust passage. This reduced the revolutions of the engines, and the engineer, not knowing the cause, and being too much under the influence of his training in steam, further opened the throttle, thereby considerably overloading and choking the motor, which resulted in the gases escaping into the engine-room, and the exhaust pipe becoming red hot and soft. This was the only occasion on which the *Vulcanus* had to be assisted. She was towed from the Elbe Lightship to Hamburg, but returned under her own power after four days' delay at Hamburg. Secondly, there was a bending of the crankshaft on a trip from Rotterdam to Barrow, due to one of the bottom end bolts breaking and fouling the crank, so bringing the engine to a sudden stop. Still, this bent crankshaft, and consequently disturbed timing of the *Vulcanus*, did not prevent the boat from running another three months, when a new shaft was put in. A third incident was the exploding of an inblast air vessel, which cost the second engineer his left arm. This was a most distressing and unfortunate accident, and happened while the engines were being tried after overhauling in the yard of the builders. Bad welding had left a fracture, and the top part of the air vessel blew right off : but the indirect cause of the accident was probably the accumulation of water

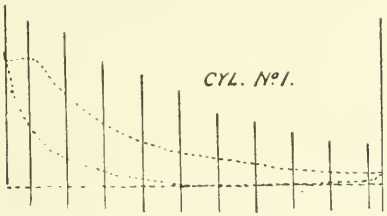
in the air vessel which had not drained because of an internal pipe being cracked. This mishap taught us not to use any more welded air-vessels, and to suspend the vessel with cover and valves downward, which effectually prevented any unknown accumulation of water.

It is scarcely necessary to say that the results obtained from the *Vulcanus*, and the experience furnished by the vessel since the engines were designed some four years ago have been invaluable elements in the improvements which have been introduced into the internal combustion engine, and the writer has collected much valuable information that will be utilized in connection with our new motor ships (four of 5,000 tons each) now in course of construction.

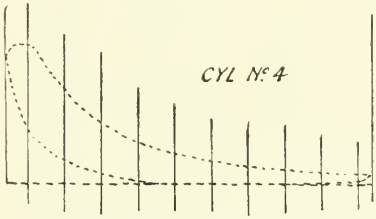
The vessels will be fitted with twin-screw four-cycle Werkspoor Diesel engines of a combined H.P. of 1,700 brake, which are expected to give a speed of 10½ knots. The writer is aware that, at present, the general tendency is in favour of the two-stroke cycle principle, and undeniably the advantages of increased power for like cylinder dimensions and in engine weight are very attractive. In the case of a warship, as a matter of fact, the question of maximum power for minimum engine weight is all-important; but, again, one has to consider the point of reliability for continuous work and under adverse and varying conditions of weather at sea. In this latter respect the four-cycle Diesel engine has, in the writer's view, proved the superiority; at any rate, vessels both large and small are now running with this type of engine and have shown themselves reliable over long distances. After two years a position of something like finality was reached and subsequent satisfactory performances of vessels thus propelled seemingly assured. Here we observe the outcome of some twelve years of experiment and research, and to sacrifice in some measure this valuable experience of the four-cycle motor's utility at sea in order to build two-cycle engines does not, from the commercial standpoint, appear by any means to be a wise course at present.

M.S. "JUNO."

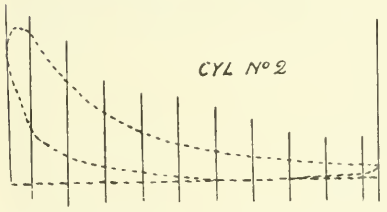
Set of Cards taken on voyage from Braila to Hamburg.



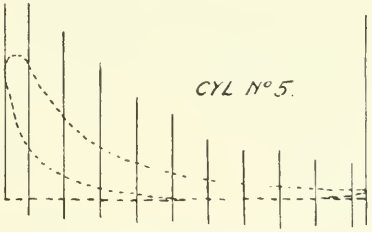
R.P.M., 120. I.H.P., 203·5.
Mean Pressure, 91·14 lbs. per sq. in.



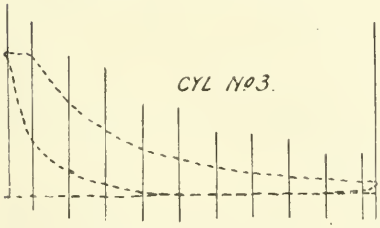
R.P.M., 120. I.H.P., 218·5.
Mean Pressure, 97·75 lbs. per sq. in.



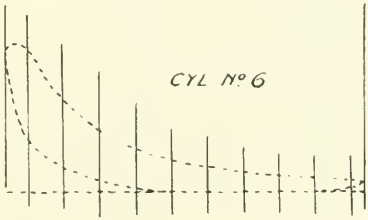
R.P.M., 120. I.H.P., 239·5.
Mean Pressure, 107·31 lbs. per sq. in.



R.P.M., 120. I.H.P., 202.
Mean Pressure, 90·40 lbs. per sq. in.



R.P.M., 120. I.H.P., 233.
Mean Pressure, 104·37 lbs. per sq. in.

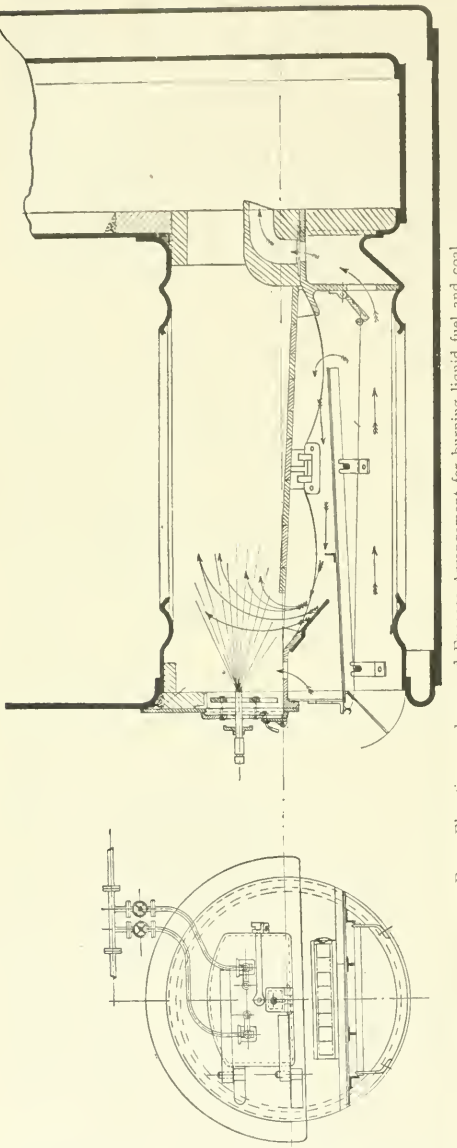


R.P.M., 120. I.H.P., 226·5.
Mean Pressure, 101·43 lbs. per sq. in.

Scale: $\frac{8}{8}$" = 14·22 lbs. per sq. in.

Revs. per min.: 120. Dia. of cylinders: 560 m/m.
Stroke: 1000 m/m.
I.H.P.—Cyl. No. 1, 203·5. Cyl. No. 2, 239·5.
Cyl. No. 3, 233. Cyl. No. 4, 218·5.
Cyl. No. 5, 202 Cyl. No. 6, 226·5.
Total I.H.P. = 1323.

Injection Air: 852·6 lbs. per sq. inch
Cooling Water Temp.: 110° F.
Temp. of Exhaust Gases: 698° F. or 370° C.
Fuel used per I.H.P. per hour = 0 1327 kg. or ·29 lbs.
Fuel consumption per B.H.P. per hour (B.H.P. = 70% of I.H.P.) = ·38 lbs.
Overall consumption, including auxiliaries = ·41 lbs.



Improved Furnace Arrangement for burning liquid fuel and coal.

Front Elevation.

Progress, however, must and will be made, and it would be idle to pretend that the four-cycle description represents the ultimate perfection of the Diesel marine motor. As a matter of fact, seeing that so many eminent engineers, both at home and abroad are taking up the two-cycle engine and show a preference for it, one may assume that in course of time the two-cycle will prove itself to be just as good and perhaps better than the four-cycle for certain purposes. But at the present stage of advancement, the writer is quite satisfied that the Company to whom his services are given are well advised to adopt the four-cycle engine. He is thoroughly convinced that the four-cycle Werkspoor Diesel engines now running and in course of construction bear satisfactory comparison, as regards weight per H.P., fuel consumption and price, with most, and perhaps all, of the large two-cycle marine engines for merchant vessels now being built, and he suspects that in point of reliability they will be superior, because of the builders' much longer experience of the construction of this type of engine. He ventures to think that experience is a quite invaluable factor in the making of Diesel engines, and that however good a new principle or departure may seem to be, defects must of necessity develop. Every engineer who has been in close touch with the manufacture and running of these engines knows how difficult it is to get metal and castings which will satisfactorily and continuously withstand the severe conditions and high temperature of the Diesel engine, and even with the four-cycle engine many have been the cracked pistons and cracked cylinder heads which had to be condemned. With the two-cycle engine the heat generated on piston and cylinder heads is double that in the four-cycle, and it is highly probable that here may be a source of trouble with the two-cycle engine on a long run from this source.

The principal drawbacks associated with the two-cycle engine are, in the writer's view :—

(1) Double heat generation of pistons ;
(2) Ports in bottom of cylinders making the permanent tightness of a liner doubtful ;
(3) Complications with scavenging pump ;
(4) Higher fuel consumption ; probably 10 to 15 per cent.
(5) No relief to moving parts, thus necessitating larger bearing surface ;
(6) Long trunk piston necessary to close ports in bottom of cylinder ; this long piston design does not make a desirable mechanical arrangement ; slight wear and tear of guide may result in " seizing " of piston.

There is one more point to which it may be desirable to draw attention before changing the subject of the comparison of different types of Diesel engines, and that is that experience has shown the advisability of occasionally examining and cleaning the pistons, particularly when heavy asphaltic or residual oils are used.

With the four-cycle engine a low piston is used, the height being about 12 in., compared with some three or four feet, as depends the stroke of the two-cycle engine. The improved Werkspoor design permits of the piston being completely exposed for examination and cleaned in from ten to fifteen minutes. The piston is removed from the bottom, there being no loose cylinder covers and the cylinder head one with the liner. This device has proved a great success and advantage, and in the case of the *Juno* all pistons were examined and cleaned in a few hours without disturbing any pipes, valves or cams. Turning to the two-cycle engine, to the best of the writer's knowledge it entails a great amount of work and expenditure of time to do this. There is the slacking back of heavy nuts which hold the cover and the removal of the entire cover with its fuel and cooling pipe connections, valve levers, etc., in order to get at the piston, which has to be loosed from the rod and lifted up in the usual way. Because of the restricted space on the gratings, only one, or at the most two, covers and pistons can be dealt with at a time, and it can readily be imagined what this means in time and labour on a twin-screw vessel with two six-cylinder engines.

The writer being himself a marine engineer of many years' experience at sea, appreciates these facts in their full practical significance, and, after very careful thought, he has come to the conclusion that for merchant vessels the four-cycle engine, apart from its supremacy, by reason of its more economical fuel consumption, will continue to show such results in general economy and reliability as will long make it a very serious rival of the two-cycle engine, to say the least of it.

The merits and demerits of the various oil-burning systems now claim attention, but before entering on this branch of the subject, the writer thinks it well to accentuate the more salient advantages of oil-fuel over coal.

1. The calorific heat value of liquid fuel is about 19,500 B.T.U., as compared with good Welsh coal having 14,500 B.T.U., or about four of liquid fuel to three of coal. This means that the quantity of heat contained in equal weights of liquid fuel and coal is 25 per cent. greater in the case of the liquid fuel. According to the description of the coal, there is a variation in favour of liquid fuel up to 35 per cent. Hence it arises that the consumption of liquid fuel contra coal in raising steam is less in the ratio of the above percentages; liquid fuel thus increasing the nett deadweight of the vessel for cargo, and reducing the required bunker space.
2. Liquid fuel can be stored in spaces where coal cannot be carried, *viz.*, double bottom, peak tank, coffer dams, etc.
3. Bunkering can be done quickly and while steamer is loading, discharging or receiving passengers on board. The importance of this fact in the case of a large passenger liner will be readily appreciated.
4. The trimming indispensable with coal is unnecessary for oil fuel, the latter being pumped direct from compartment to furnace; hence a saving of manual labour and reduction in number of firemen.
5. No cleaning of fires is needful, and with no ashes to deal with, the stokehold remains cleaned, with resultant reduced cost of upkeep of stokehold and boilers. Again, no cleaning of fires being necessary, no cold air can get access to the furnaces, so that leakage and other damage of boilers on account of unequal expansion and contraction is avoided.
6. Steam production can be readily adjusted, according to requirements, and the standby loss over banked fires largely avoided.
7. Great regularity in steam production, the maintenance of better speed through dispensing with the cleaning of fires, and enhanced efficiency of boilers owing to absence of smoke and soot, whence is derived a much cleaner heating surface than with coal burning.
8. Full steam can be maintained throughout long runs by purely mechanical means, and the oil-fired ship is entirely independent of skilled firemen, an important consideration with mail steamers.
9. Wear and tear of boilers is less, as they are kept at a uniform temperature with closed fire-doors and fixed steam production.
10. Greater efficiency of the boilers from more perfect combustion, with less air, less products of combustion, less heat lost in funnel and with a hotter furnace.

Oil fuel, as is well known, may be consumed with practically any type of steam boiler, and the following are the methods chiefly in favour:—

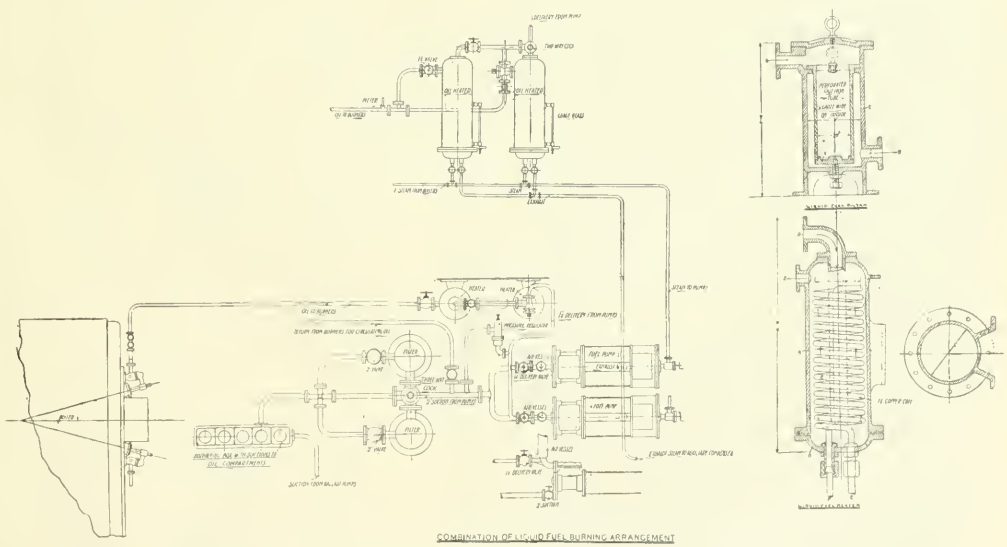
1. Mixing the oil with a steam jet and heating and atomizing it by means of a steam burner of simple design, through which the oil is forced under low pressure by means of a pump or of gravitation from a settling tank.
2. Using compressed air burners, which act on the same principle as steam burners, but which involve air compressors, thus rendering the installation somewhat complicated and expensive, and reducing reliability.
3. The direct pressure system without the use of steam or compressed air to atomize and burn the fuel.

It is proposed to give a short description of each of the foregoing systems, with a few remarks as to which would be found to be the most advantageous under certain conditions.

Firstly, burning oil-fuel by means of steam:—

In principle, the method consists of heating and atomizing the oil fuel by means of steam from the boiler. The installation in its simplest form is made up of a small steam pump conveying oil from bunker to daily supply tank, placed in some convenient position high up in stokehold or on casing. The oil, after passing a filter, gravitates to the burner, of which a good and simple type is shown.

The daily supply tank is usually fitted with a steam coil to facilitate the separation and settling of any water which may be mixed with the oil. On looking at the sketch of the steam-burner, it will be noted that the oil in passing through the internal tube is heated by the surrounding steam, while the oil fuel is thoroughly atomized by meeting and mixing with the steam at the removable nozzle. The burner is lighted by means of a few pieces of wood being ignited in some waste soaked in kerosene. Once started, the proper amount of steam in fuel can be adjusted to a nicety, and a bright, smokeless, but not entirely noiseless, flame produced. There is, however, one great drawback to burning liquid fuel with steam, in that the operation entails using a considerable quantity of fresh water, which must either be carried,



COMBINATION OF LIQUID FUEL BURNING ARRANGEMENT

Combination of Liquid Fuel Burning Arrangement showing Pumping, Filtering and Heating Plant.

thus reducing the ship's deadweight carrying capacity, or procured from sea water by means of evaporation, with consequent higher consumption of fuel. It is for this reason that sea-going vessels burning liquid fuel are rarely fitted with an installation of which the use of steam is a feature.

Secondly, the consuming of liquid fuel by means of compressed air :—

Of this it has already been observed that it complicates the plant by the addition of air compressors, thereby increasing first cost and expense of maintenance to an extent which, in the commercial aspect, greatly militates against its desirability. Nevertheless, the method is extensively adopted on warships, and it must be admitted that smokeless combustion is readily obtained and that the consumption of fuel is economical.

The compressed air burners work on the same principle as the steam burners, air pressure varying from 1 lb. to 5 lbs. The air is heated by passing through a pipe in furnace or through suitable heaters placed in uptake. The admission of air and fuel is regulated by hand-wheels, which operate pinions and racks controlling the fuel and air tubes, so that the apertures are opened and closed as may be necessary.

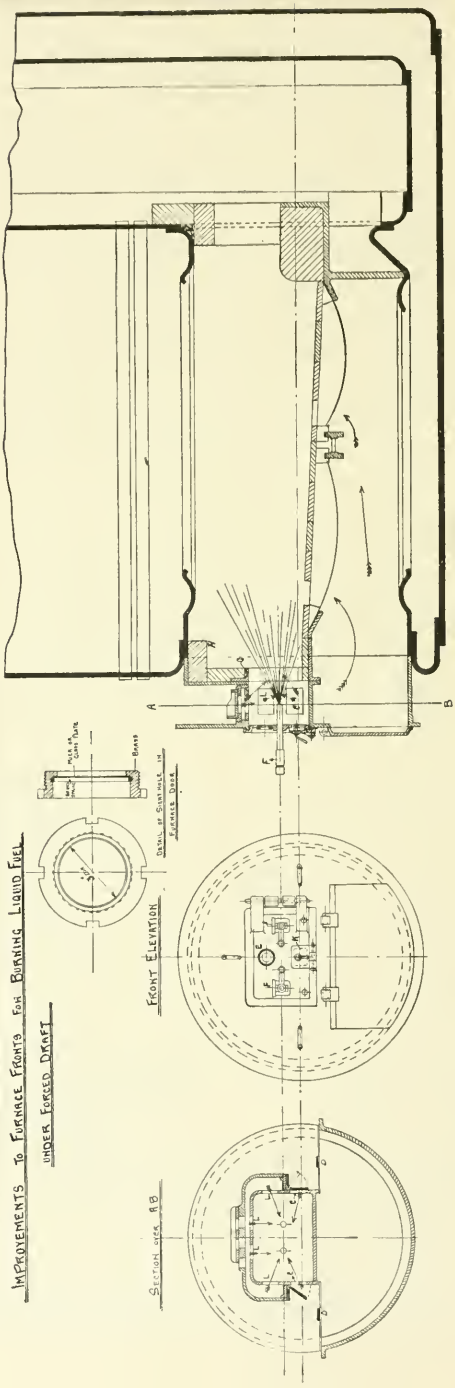
Thirdly, the direct pressure system :—

This system is generally used for commercial purposes, and can be utilized under either forced or natural draught. It may here be observed that the forced draught method, as well as the natural draught, is well adapted to burn liquid fuel and to secure smokeless combustion. The same furnace fronts may be used in each case for both oil and coal burning, and conversion to either fuel can be accomplished with facility and speed. Furnace fronts and arrangements for burning liquid fuel under natural and forced draught are shown.

With the direct-pressure system, the fuel is filtered and heated, and, at a pressure of 30-100 lbs., pumped through an atomizer (burner) which is fitted in furnace front. On ignition, the oil burns with a bright flame, and so continues so long as a sufficiently high pressure is kept up and the temperature of the oil (varying, in accordance with the flash point, from 150° to 200°) is maintained. The burners are set away by means of a torch or a piece of burning wood as soon as the oil has attained the required temperature, which, when lighting up, is brought about by circulating the fuel through the heaters. Various drawings are submitted showing complete installation, furnace arrangement, burners, etc.

Turning to the problem of safety and comparing the risk of burning coal and burning liquid fuel, the writer is convinced that, if reasonable care be taken, there is no more danger when using liquid fuel than when using coal, and that on considering the carriage and storage of both fuels, it would appear that liquid fuel can be carried with a greater measure of confidence than coal, in view of the liability of the latter to spontaneous combustion. It may further be urged that, unlike coal, liquid fuel does not deteriorate to any degree of loss in its calorific value. The measure of safety with which liquid fuel may be consumed in ships' furnaces is largely dependent on the flash point of the oil. With the facilities for storage and burning now chiefly adopted in vessels using liquid fuel, this should not be less than 150°F., unless special precautions have been taken in the shape of separate oil and gas-tight compartments for pump, heater, filter, etc., and even then the writer is of opinion that skilled attendance would be required in order to avoid accidents.

The peculiarly penetrating nature of oil fuels, and especially of light oils, is well known, so that it is extremely difficult, if not impossible, to prevent small quantities of leakage oil from finding their way to stokehold bilge through either joints of fuel system or leaking seams or rivets of bunker. High-flash oil is almost harmless as long as the surrounding temperature keeps well below its flashpoint This has invariably been found to be the case, even when the fuel is close to the boilers in stokehold, and for this reason naked lights can be used in the immediate vicinity without fear of accident. But low-flash oil, besides filling the boiler-room with obnoxious and inflammable emanations, would readily catch fire from a spark or naked light. A signal advantage possessed by high-flash oil in the matter of safety is that, should, through negligence, a fire break out in the stokehold—because, for instance, of liquid fuel being allowed to leak



Drawing showing improvements to furnace fronts for burning liquid fuel under forced draught. Vertical Longitudinal Section

into bilge and there accumulate—it could readily be extinguished by a spray of cold water; for water would at once lower the temperature of the oil to below its flashpoint and prevent a continuation of the outburst.

Contrary to the popular belief that water on burning oil makes matters worse, the writer has found that in dealing with burning liquid fuel of high flashpoint, there is no better and speedier fire-extinguisher than water, which, on board ship, is always at hand in abundance by keeping the ballast pump ready for the purpose, or in a loaded ship, by simply opening the ash-cocks. Liquid fuel and water mix easily on account of the specific gravity being nearly equal, 0·95 and 1, while a mixture of liquid fuel and water cannot burn. The best means of preventing accidents in the shape of fire are, of course, cleanliness and a liberal use of the hose in washing floor plates and bilge out occasionally. In thus removing all trace of liquid fuel, the risk of fire is likewise removed. With these few remarks the question of safety under liquid-fuel burning conditions may be dismissed.

No review of the advantages of liquid-fuel burning, however cursory, should fail to refer to the need that must occasionally arise of converting the furnaces of liquid-fuel burning steamers to coal. From the commercial aspect, indeed, this is a matter of much importance, and it may here be mentioned that, to meet the requirements of vessels which trade to countries where coal is cheap and liquid fuel costly, or coal dear and liquid fuel cheap, as the case may be, and which, for this reason, find a liquid fuel-burning system, inexpensive and speedy in installation, a great desideratum, the writer some years ago, in an effort to meet this want, designed a system which has yielded satisfactory results.

With this method, a steamer's boilers can be converted in a few hours from coal to liquid fuel or *vice versa*. The expense amounts to a few pounds for a couple of hundred fire-bricks, and the ship's own staff can effect the conversion without any trouble or delay to the steamer. As a matter of fact, coal and liquid fuel could, if so required, be burnt at one and the same time. For cargo and mail ships it would be a great advantage if they could burn, at a moment's notice and without expense in conversion, either liquid fuel or coal, as was the more economical under the immediate circumstances. Nearly all large steamers now have double bottoms, of which the capacity ranges from 500 to 1,500 or 2,000 tons. In this, liquid fuel could be carried; permanent bunkers need not be altered, but could be allowed to remain always available for the reception of coal.

The reason big steamship companies are not at present adopting liquid fuel burning methods on their vessels undoubtedly revolves about the problem of supply; and, at the present stage of the evolution of liquid fuel, it must be admitted that ample and continuous supplies could not be relied upon at their steamers' various ports of call. For a steamship management to incur the possibility of delay to a liner in laborious conversion to coal burning, because of the depletion of local liquid fuel stocks, is naturally a position which they will not contemplate, and the arousing of their active interest in the subject must clearly await the removal of this disability. With the writer's system, this one great impediment to their adoption of liquid fuel is conclusively surmounted. As a demonstrable fact, a steamer burning liquid fuel could in a few hours be made to burn coal, and the coal loaded into the ship's permanent coal bunkers, the double bottom, as has been remarked, being reserved for liquid fuel. Again, some of the boilers could, if advantageous, be fired partly with liquid fuel and partly with coal, and the conversion could be effected at sea without loss of time or reduction in speed of vessel.

The method under notice is equally adaptable to stationary or locomotive boilers on shore, and has importance in this connection, if only because of recurring coal strikes. The freedom of manufacturers who use steam from this source of possible interruption would be assured by the fact of their preparedness to burn liquid fuel in an emergency, and when the mining industry resumed its normal aspect, reversion to coal would be a simple, speedy and inexpensive matter. Largely for this reason, no doubt, the subject of liquid fuel has of late enjoyed increased favour in this quarter, and signs are not wanting that the introduction of a system which met all possible objections would result in a great impetus to the growing popularity of liquid fuel in our manufacturing centres.

Having submitted this brief review of the advantages of oil fuel over coal for power-producing purposes, one must deal with three questions that would be asked by every business man:—

(*a*) What would be the price of this oil fuel?
(*b*) At what points could it be obtained?
(*c*) Can regular supplies and stocks be relied upon?

With regard to the price of oil under existing abnormal conditions of insufficient transport facilities and consequent high freights, it is at present naturally higher than it will be when the fuel has assumed its right commercial position, and varies for each particular port in accordance with its distance from oil-producing centres. The writer is not inclined to go into the prices at which oil fuel can be bought at various European and Far Eastern ports under the now changing conditions. Suffice it to say that with the enormous increase in the production of oil we now witness, the active opening up of new territories and the building of so many tank steamers that the completion of a boat is almost a daily incident, the price of liquid fuel will soon fall to a level at which shipowners throughout the great ports of the world will be compelled to admit its advantages over coal. And here the fact may be mentioned that, of late, the price of coal has advanced considerably, while even higher prices are apprehended in future years. Again dwelling, also, on the salient facts that a ton of oil in a Diesel ship does as much work as 4·5 to 5 tons of coal, that there is a marked saving in *personnel* and that there is an increased deadweight cargo-carrying capacity, it is clear, oil must in some parts of the world entirely supersede coal, as, in truth, it has already done to a certain extent.

It may be interesting to name a few ports where large stocks of fuel oil are kept. They are:—London, Rotterdam, Bizerta, Black Sea, Port Said, Suez, Colombo, Madras, Karachi, Bombay, Calcutta, Rangoon, Singapore, Balik Pappan, etc., and all over Eastern Hemisphere, Australia, America, etc., and within a comparatively short period oil fuel will be obtainable on all the principal trade routes of the world. In Borneo and Texas enormous quantities of fuel oil are waiting to be placed on the market as soon as sufficient tank steamers are available.

The writer is well aware that, as a rule, ship-owners are of a rather conservative disposition with regard to the adoption of new methods so entirely different from established practice, but when the Diesel engine from its first appearance some twelve years ago as a power producer has so conclusively proved its enormous superiority in fuel economy, as well as in other respects, as compared with the use of steam, also for marine propulsion, there can be no doubt that it would be sound policy on the part of shipowners to avail themselves of its obvious advantages.

As regards the use of fuel oil for steam boilers, the writer is of opinion that there is still an enormous field for its adoption for all classes of vessels, both those in service and in course of construction, and particularly so in conjunction with the turbine for war and passenger ships of high power. For although high-powered Diesel engines have been recently built and are said to be running satisfactorily on the test bed, developing as much as 2,575 H.P. per cylinder, some time and experience are no doubt yet required to develop engines of this power per cylinder into absolutely reliable prime movers for present-day Atlantic greyhounds or powerful war vessels.

The Story of the P. & O. Line.—An interesting account with illustrations of the history of this Line will be found in the January number of this journal.

Modern Condensing Systems.—On Feb. 14th, Mr. A. E. Leigh Scanes, M.A., of Manchester, read an interesting paper on "Modern condensing systems" before the members of the Institution of Mechanical Engineers. The paper was profusely illustrated.

The Largest Oil Tanker.—On Feb. 22nd, Messrs. Swan, Hunter & Wigham Richardson, Ltd., launched from their Wallsend shipyard the largest oil tank steamship in the world. The vessel has been built for the Eagle Transport Co., Ltd., of London, and her dimensions are:—Length, 541½ ft. overall; breadth, 66½ ft. She will carry 15,500 tons of oil on a draught of 28 ft.

A NEW DIRECT-ACTING STEAM PUMP.

We have pleasure in giving a description of an extremely interesting direct-acting steam pump, the valve gear of which is a striking departure from the usual run of these gears, and possesses features which would appear to place it quite in a class by itself.

The advantages of the direct-acting pump, that is to say, a pump in which a reciprocating action is obtained without having recourse to any rotary motion, as opposed to the crank-driven flywheel pump, for a great number of duties, are too well known to need any discussion in the present article. At the same time, it is necessary to bear in mind the fact that the service efficiency of these pumps is in direct proportion to the efficiency of their steam distribution gear. This being the case, it has always been the aim of makers of this type of pump to obtain a valve gear which, in the three essentials of simplicity, accessibility and reliability, should approach, as nearly as possible, the ordinary eccentric operated slide valve.

To those who have studied the progress of the direct-acting pump, from its initiation up to the present day, and are familiar with the multiplicity of valve gears which have been introduced during that period, it must have been evident that while of a number a few have proved themselves capable of working satisfactorily, there is not a single one which can, with any degree of truth, lay claim to have reached finality as represented by the ordinary slide valve mentioned. This being the case, the description of a valve gear which appears to be, in this respect, far in advance of anything yet produced, should, we think, prove of special interest.

Before discussing in detail the working of this valve gear it may be advisable to briefly consider some of its most salient points.

Firstly, the action of the gear is positive; that is to say, the valve which controls the admission of steam to the main cylinder, and which, by the way, is an ordinary "D" slide valve, is itself positively controlled by a valve rod, and does not depend on steam for its initial displacement. This is an extremely important feature, as it not only entirely does away with any question of the valve gear sticking through dirt, rust or any other cause, and makes the working absolutely certain under all conditions, but it gives a smoothness and sweetness of action which is only associated with a well-made, crank-driven pump. This is explained by the fact that the slide valve being positively controlled it is possible to gradually close the port which is admitting steam to the main piston as the latter nears the end of either stroke, so that, instead of travelling at full speed all the way and pulling up suddenly at the end, it is gradually slowed down and the reversal is effected perfectly and gently, without the sudden jerk which characterizes the action of the ordinary steam operated gear.

Secondly, and perhaps most important of all, the positive action of this gear ensures safety; that is to say, should the pump, when working against heavy pressure, suddenly lose its water and race away, the action of the gear prevents the main piston from striking either end of the cylinder a succession of violent blows and thus possibly doing serious damage.

The valve gear itself is extremely novel in that it forms a complete and separate unit—rather aptly termed a positive action slide valve—which may be lifted into or out of the valve chest at will by simply removing a single cover. This gives the most complete and instant accessibility that could be desired, it being even more readily removable than the ordinary steam engine slide valve. The great value of accessibility to the working parts of a machine, more especially, perhaps, in the case of a feed pump, is so well understood and appreciated that it would be superfluous to enlarge on it further here. Suffice it to say that, in our opinion, this feature alone should go far to popularize this gear.

The steam cylinder and valve chest are in one casting, the valve chest simply consisting of a rectangular box, into which the valve gear is placed. This, besides being in itself an excellent thing in that it dispenses with the big steam joint between the cylinder and the valve chest, which is usual on all other pumps of this type, it naturally follows that the valve gear is completely steam jacketed while at work, also it is a simple matter to entirely lag both

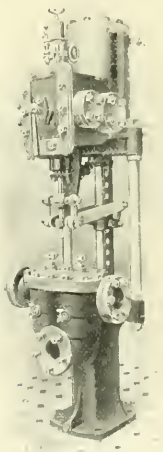


Fig. 1.

cylinder and chest; considerable steam economy should thus result, loss through condensation being reduced to an absolute minimum. A very neat and distinctive design also follows.

There are two other features belonging to this gear which are worthy of mention. These are (1) its extreme compactness and simplicity, there being no shuttle valve, its place being taken by a small block piston of the very simplest description, fitted with spring rings and such that it could easily be replaced by an ordinary small repair shop, and only two moving parts; and (2) the ease of adjustment of the wearing parts. All wearing parts, being flat surfaces, may be scraped up to a face by an ordinary fitter, and this may be done many times before replacement is necessary.

In the adjoining illustrations we show in fig. 1. an outside view of the pump; in fig. 2 a sectional view, with the valve box cover, slide valve and operating cylinder removed from position; and in fig. 3, to a larger scale, the latter parts in place.

We may now proceed to a description of the construction and working of the gear. Referring to the sectional views in figs. 2 and 3: The steam cylinder and valve chest (*a*) are in one casting, the valve chest

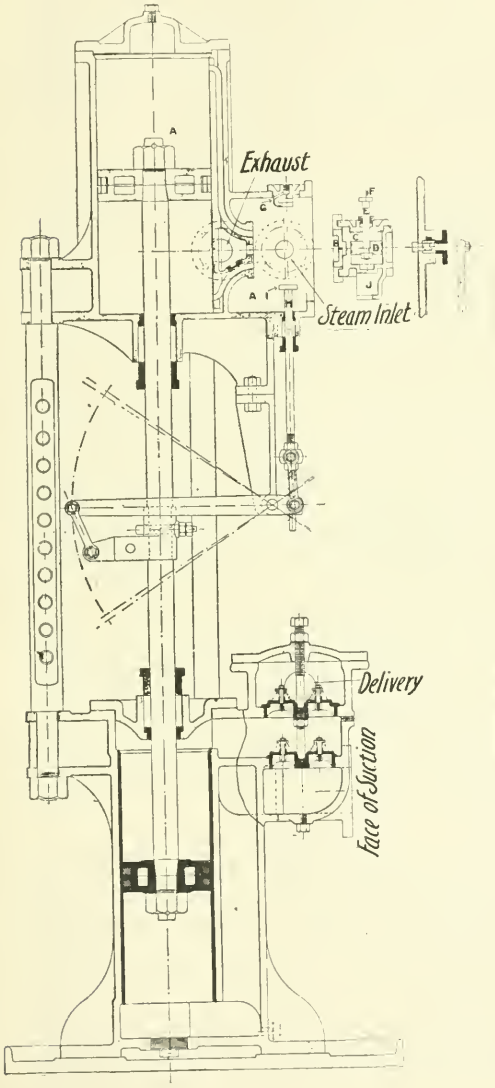


Fig. 2.

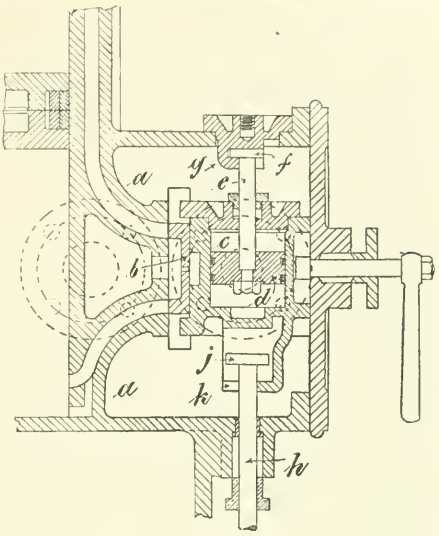


Fig. 3.

simply consisting of a rectangular box. The main steam cylinder has an ordinary three-ported valve face, on which works an ordinary slide valve (*b*). On the back of this valve is a small subsidiary steam cylinder (*c*), having, on the side abutting on the valve, a flat face which is in contact with, but free to slide on, the back of the valve. Inside the cylinder (*c*) is a piston (*d*), attached to which is a piston rod (*e*), which passes up through the upper cylinder cover and has on its outer or upper bend a circular head (*f*), which is of larger diameter than the rod itself. This head fits into a specially formed recess in the small cover (*g*) of the valve chest, which recess is so arranged that, while the head of the piston rod may be drawn out horizontally at will, no vertical motion is possible. It will thus be gathered that the ordinary order of this is exactly reversed in that the piston (*d*) is held in one fixed position, while the cylinder (*c*) is free to move on it. Through the lower side of the valve chest works the rod (*h*), which is operated, as will be seen in fig. 3, by levers attached to the main piston rod, a fulcrum being provided by a bracket bolted to a lug on the main cylinder casting. The rod (*h*) is, like the rod (*e*), provided with an enlarged circular head (*j*), which works inside a socket (*k*), which latter may be an extension of the cylinder casting (*c*).

Supposing now that steam is being admitted to the bottom side of the main piston, the top side being open to exhaust, the sequence of operations is then as follows:—

The main piston, travelling upwards, pulls the valve rod (*h*) downwards. When this rod has travelled down a certain distance the head (*j*) engages with the lower face of the socket (*k*), and thus pulls down the cylinder (*c*), and with it the slide valve (*b*). At

the moment that the head (*j*) engages with the lower face of the socket (*k*) two small ports, which are arranged one on either side of the slide valve (*b*), but which are not shown in the engraving, come into register with two other small ports, which are arranged one on either side of the cylinder (*c*), but which are also not shown on the drawing. Just before the main piston has completed its stroke and when the lower main steam port is nearly closed, the head (*j*) has pulled the cylinder (*c*), and with it the valve (*b*), so far that the small port on one side of the slide valve passes over the edge of the main steam port face, while at the same moment the small port in the other side of the slide valve is put into direct communication with the main exhaust port. The result of this is that live steam is admitted to the lower end of the small cylinder (*c*), shooting it over the remainder of its travel and carrying with it the slide valve (*b*). This action opens the upper steam port to exhaust. On the down stroke of the main piston a similar series of operations is gone through, the small cylinder being in this case pushed up instead of being pulled down.

The makers of this pump are Messrs. Robert Warner & Co. (Engineers), Limited, of Walton-on-the-Naze, Essex, who have obtained the sole licence to manufacture both in this country and abroad from the patentee, Mr. Wynnard Anthony, and they point out that this gear is equally applicable to any pumping duty where a steam pump is used.

THE FLEETS OF THE MAIL LINES.

(*From our Own Correspondent.*)

Another Important Salvage.

A MONTH ago we had the pleasure of recording the fine performance of the Dominion liner *Welshman*, which brought the broken-down Furness liner *Snowdon Range* to the Irish coast under conditions which appear to have been trying enough. Another important service has now been reported. This too has been performed by a Liverpool steamer the *Devonian* of the Leyland Line. She was bound from Boston to her home port under Captain Trant, one of the oldest shipmasters in his Company's service, and had proceeded a couple of days on her voyage when she was apprised by wireless of the peril of the large steamship *Mexico*, of the Compagnie Générale Transatlantique's cargo service. The distressed vessel was lying some 180 miles east of Cape Sable with a broken shaft. The *Devonian* was at once headed for the position indicated in the message, and a day later found the object of her search. She then took her in tow, and, in spite of severe weather, placed her in safety in the port of Halifax. This having been duly effected the *Devonian* proceeded on her interrupted voyage for Liverpool.

The bad weather, of which so much has been prevalent during the past few months, is responsible for a further batch of overdue and missing steamers. The *Whittinghame*, which left Baltimore for Rotterdam on the 20th November, just three days before the *Snowdon Range* started on her memorable voyage, has now been posted as missing. She was a steel screw steamer of some 3,800 tons gross register, built as recently as the year 1904, at Sunderland, by Messrs. Pickersgill. She had only just been acquired by new owners who had renamed her, she having previously been known as the *Jura* of Liverpool.

Then there is the case of the *Sola*, a steamship of over 3,100 tons gross, recently the property of the Buenos Ayres and Great Southern Railway, but formerly belonging to a well-known firm of North Country shipowners. She was bound from Newport, Monmouth, to the River Plate, having sailed just before Christmas. Serious anxiety concerning her safety, however, was felt before she had been gone three weeks, in consequence of the discovery of the remains of a boat, which bore her name, in a cave on the Cornish coast. An attempt was made to get consolation from the well-known fact that a vessel often loses a boat without herself suffering much injury. But other wreckage came ashore from time to time and still more lately came the significant fact that a body was found, which has since proved to be that of her master.

As to the fate of two other large steamships considerable anxiety is also expressed. These are the *Armstor* of the Holman Line and the *Therese Horn* of the Horn Line. The first named steamship is of just under 3,000 tons gross, and was built in 1909 at Hartlepool by Messrs. Irvine's. She left New Orleans for Aalborg on the 23rd December with a cargo of cotton-cake. The other vessel is owned at Lubeck and is about forty tons larger than the *Armstor*. She was built at Flensburg in 1904. Her voyage is from Port Arthur in Texas to Rotterdam, and she sailed on Boxing Day. Both ships are now out of the list, that is to say they have become uninsurable.

An Unfounded Aspersion

upon British seamen was thrown out by the American press in relation to the loss of the United States steamship *Julia Luckenbach*. This vessel sank in Chesapeake Bay on the 3rd January, after collision with the large British steamship *Indrakuala* of Liverpool. Some fifteen lives were lost by the casualty and American pressmen did not hesitate to say that the loss of life was due to the failure of the officers and crew of the colliding ship to render proper assistance. The Court of Inquiry, ordered by the United States Government, entirely repudiated this view and held that the facts were quite the other way. To begin with the duty under the regulations was laid upon the *Julia Luckenbach* to stop, and if need be, reverse when she heard, as she did, the whistle of the *Indrakuala* forward of her beam. Instead of doing what she should have done, she continued at full speed. Hence the collision, for whose occurrence the Court found her wholly to blame. In regard to the measures taken to save the crew of the *Julia Luckenbach* it was pointed out by the court that the severe damages sustained by the British steamer at once put her down by the head and made it extremely difficult for her to manœuvre at all, and indeed rendered it imperative that no time should be lost in putting her, as her master did, on to the ground to prevent her sinking in deep water. Nevertheless, under the most difficult circumstances, the rescue of six of the crew of the American steamer was effected by her and a generous mead of praise for their seamanship was awarded to her people by the Court.

Alexandria as a Repair Port.

Towards the end of last year the Belfast steamship *Star of Australia* broke her shaft in the Indian Ocean, and became overdue. She carried a valuable cargo of Australian produce and was eventually taken into Aden by the steamship *Glen Lochy*. Thence she was towed in January to Alexandria and there she has been repaired in dry dock by the Khedivial Mail Company. The broken shafts were drawn, a new stern tube fitted, and new shafts and new propeller put in place and the vessel undocked within the short space of six days. As the *Star of Australia* is a vessel of not far short of 7,000 tons gross register this is a most creditable performance.

The New Australian Navigation Act

now only awaits the Royal assent. There is one saving clause which may prevent the enactment becoming quite as serious a stumbling block as it would at first sight appear. The clause in question gives the Governor General for the time being power to declare that the carriage of passengers between specified ports in Australia shall not be deemed to be engaging in the coasting trade within the meaning of the Statute. But apart from this the provisions of this Act, if enforced, will have sufficiently serious consequences for British shipowners. When in Commonwealth waters all seamen—whatever may be their colour—will be entitled to receive wages at the rate for the time being ruling in ships engaged in the local Commonwealth trade. This provision seems to bear especially hardly upon those shipowners who employ lascars, for, of course, the lascar is not worth the wage of the British seaman. He obtains a much lower rate

though the full benefit of the difference cannot be reaped by the employer, owing to the fact that it requires considerably more Asiatics to do a certain amount of work than would be the case if white labour were employed upon the job. The receipt of subsidies, as distinguished from the payment for the carriage of postal matter will disentitle steamship companies from maintaining services to Commonwealth waters. This provision may be found exceedingly irksome by certain foreign companies. Then there are heavy requirements in respect of the accommodation of the crews of all ships entering Australian ports. The men's accommodation must allow not less than 18 square feet of deck area and 140 cubic feet of space to each man. The accommodation must not be below the load line. The bunks are to be of metal. Mess-rooms where possible must be provided, or failing that mess tables must be fitted in the forecastle. The quarters must be properly ventilated. Hot water must be attainable for washing purposes, at least for the engineer's department, and sanitary accommodation, including hospitals, lavatories and bath-rooms to the satisfaction of the inspectors must also be fitted. The intellectual wants of the men must also be cared for. If a special library be not provided for the use of the crew in passenger ships, the passengers' library is to be at their service and they are to be allowed to borrow books from it. Whether in all details the enactment is a wise one, it were impossible to judge at present. But it is abundantly certain that the way to attract the right class of men to the sea life is to improve the conditions under which they live whilst on board the vessels on which they are employed. The conditions of life on land for the middle classes and the superior artizan have immensely improved during the last half-century. So too has the accommodation of passengers at sea, and indeed that of the crews of the great liners. But there are still ships where the forecastles are unfit for decent human habitation, and if the example of their fellows and the call of their own consciences will not make the owners of these ships do the right thing by those who serve them, it is incumbent on the State to see that they do their duty. At the same time it is easy to make too large and too sudden a reform.

The Ice Danger.

Something is at last to be done by our Government to meet the dangers of the North Atlantic. By itself it will not even now work. But as the great steamship companies have offered to contribute towards the cost of the experiment, it has agreed, through the Board of Trade, to provide an old whaler, the *Scotia*, a vessel which has had experience in Arctic exploration, for service as an ice patrol. She is during the ice season to be stationed somewhat to the North of the steamship lanes, and being fitted with a long distance wireless installation, will communicate the news of the approach of ice to the route frequented by the important steamships. Thus in addition to the warnings already collected and disseminated by each passing steamer as to what is already in the track, there will be the additional safeguard of some knowledge of what may shortly be expected there. The vessel, besides her look-out work is to study ocean meteorology and the action of ocean currents, especially in regard to their effect upon the movement and direction of the ice. To enable her to make the best use of her opportunities the *Scotia* is to carry a scientific staff of observers That the experiment will be carried out on practical lines seems to be guaranteed by the fact that the companies are joining in its inauguration. But it remains to be seen how far it will avail.

The Canadian Pacific Railway

has entered into an agreement with the Austro-Hungarian Government for the maintenance of a new service between Trieste and Canadian ports. This action has been strongly resented by the German shipping interest and counter services and rate cutting are talked of. Thus the great prosperity which has of late prevailed in this, as in other trades, seems likely to be interrupted. On the other hand in

The Cape Trade

there was some fear of competition and disagreement between the British and German lines to the South and East coasts. It is now officially declared that an arrangement has been come to by which all interests will be satisfied and smooth working assured.

Atlantic Travel.

The usual returns as to landings of passengers at New York have now been completed for the year 1912. The totals show an improvement of over 25 per cent. as against those of their predecessor.

In the year 1911 there were landed 845,510 passengers, whilst in 1912 the total increased to 1,066,345. Nevertheless the number of saloon passengers in the last year under review was slightly lower than in 1911, the increase being entirely in second and third classes, the latter being up no less than 220,000 persons. In looking over the figures for the various lines one sees decreases in the first and second class for the American Line from Southampton, though a great increase in the number of steerage. As regards the two superior classes the same is true of the White Star trade from the same port, as well as in that of this Company from Liverpool. But there is a slight increase in the cabin workings of the Compagnie Générale Transatlantique; of the Hamburg American Line; and of the Holland American Company. The Nord Deutscher Lloyd has an increase in all classes of its Bremen trade. But the steerage figure is the most notable, for the Company carried 90,066 in 1912 as against 51,799 emigrants in 1911. One has to go back to their figures of 1909 to top this figure, as they carried 91,692 in their steerages in the year named.

The Allan Line

has now placed in the window of its Cockspur Street Office a large and detailed model of one of the new steamships which are in course of completion for its Liverpool and St. Lawrence mail and passenger service. The vessel in question will be know as the *Alsatian*, whilst her sister will be called *Calgarian*. These vessels are being fitted with turbine machinery—a fact which shows that the company, who with their *Virginian* and *Victorian* were the introducers of this type of machinery into the North Atlantic passenger trade, are abundantly satisfied with the type of machinery for fast ocean traffic. But the most striking point in the model, and one which will interest nautical persons, is the stern. The ships are fitted with "cruiser-sterns," and are so arranged above the water line that their appearance recalls that of the old-fashioned men of war, which were fitted with stern galleries, though in point of fact the Allan liners will go one better than they, inasmuch as they will have tiers of such spaces instead of the single admiral's walk of the old warships.

SMOOTH-ON CEMENTS.

THE economic value of "Smooth-on" cement has been tested and recognised for some time, and an illustrated pamphlet has now been issued to illustrate the various purposes to which it may be applied in the different mixings modified to suit the material in connection with which it may be used. This descriptive pamphlet will be sent to any one interested, on application to The Smooth-on Manufacturing Co., 8, White Street, Moorfields, London. The services rendered by these cements may be briefly referred to for the information of those who have not previously had experience of them. Main engine columns used as oil tanks, valve chests or other castings which have holes due to original defects or to corrosion, may be made good by an application of Mixture No. 1 for quick setting, or No. 2 for slow setting, and can be relied upon to keep sound and prevent leakage against either steam or water. In paste form No. 3 is a plastic cement suitable for boiler seams and landings which give trouble by leakage, a defect which is not only troublesome in itself but tends to the wastage of adjoining plates. No. 3 is specially applicable for leaky rivets to cover up the edges and encase the head, while Nos. 4 and 5 are used to give a good surface to rough castings, and for jointing purposes respectively. There is a further preparation for coating fire bricks to preserve them amid high temperature, as the cement in all its forms stands intense heat.

Messrs. James Pollock, Sons, & Co., Ltd., have just booked an order for a steel twin-screw light draught motor tug to be fitted with two sets of Bolinders motors, each having a b.h.p. of 80. The dimensions of the vessel will be 85 ft. length, 17 ft. 6 in. breadth, and 5 ft. 6 in. draught.

THE NEW SMALL GERMAN ARMOURED CRUISERS.

The knowledge that the six small cruisers of the "Stralsund" class are furnished with armour-belts came as somewhat of a surprise to the naval world. German designers have been so often reproached for lack of originality that it is somewhat of a novelty to find them introducing almost a new type of warship and not perpetuating standard designs or plagiarising existing ones. The ships concerned are the *Breslau*, *Magdeburg*, *Stralsund*, *Strassburg*, *Karlsruhe* and *Rostock*, of which the first four were set afloat in 1911 and the last two at the end of 1912.

It will be remembered that from 1897 onwards eight classes of cruisers, twenty-seven in all, have been turned out, the gradual increase in size and power being shown in the table which follows, from which it will be seen that although the armament has remained practically the same in all, the size—and corresponding sea-keeping powers—has almost doubled and the speed increased by eight knots on the actual trial figures.

	Tons		H.P.		
1898 *Gazelle* (2)	2,645	X 4·1 / XIV 1 pdr.	8,500	21	knots
1900 *Amazone* (5)	2,660	,,	8,500	21	,,
1902 *Arcona* (3)	2,715	,,	8,500	21·5	,,
1903 *Bremen* (5)	3,250	,,	11,000	23	,,
1904 *Leipsig* (2)	3,250	,,	11,000	23	,,
1905 *Konigsberg* (1)	3,400	,,	13,200	23·5	,,
1906 *Stuttgart* (3)	3,450	,,	13,200	23·5	,,
1907 *Dresden* (2)	3,600	,,	13,500	24 5	,,
1908 *Kolberg* (4)	4,350	XII 4·1	20,000	25·5	,,
1911 *Stralsund* (4)	4,470	XII 4 1 / IV 5 pdr.	25,000	26·75 (27·2)	,,
1912 *Karlsruhe* (2)	4,900	,,	29,000(?)	27	

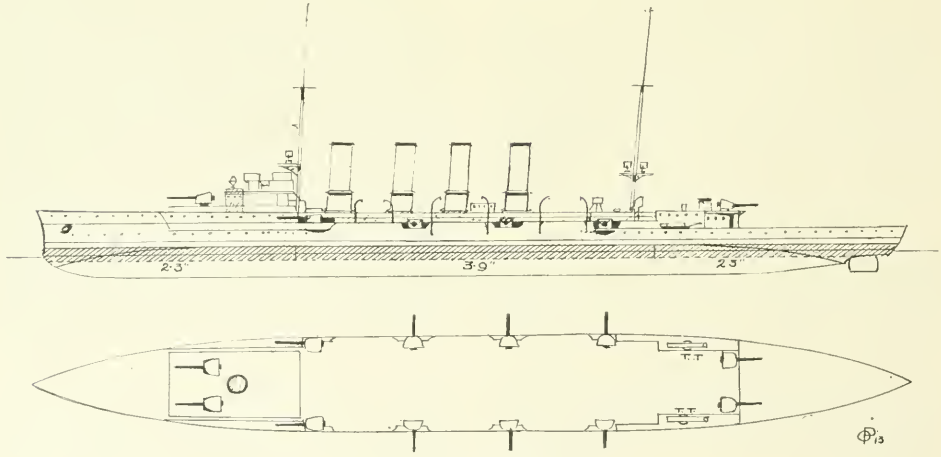
The last two classes are practically identical in appearance and design, the increased displacement of the *Karlsruhe* and *Rostock* being absorbed by an augmented coal supply of 200 tons (1,400 as against 1200) and some improvement in the armour protection.

But whereas the earlier types were unarmoured the last six are virtually "armoured cruisers" as they have belt protection along the water-line, 3·9" amidships, tapering to 2·3" fore and aft, reinforced by the protective deck which is 2" amidships and $\frac{3}{4}$" bow and stern. The conning tower forward is 3·9" with a 3" roof. What depth the belt extends below water is uncertain, but taking their large coal supply and heavy engine and boiler installation into consideration, their displacement cannot permit of its being carried down very far.

The large coal supply has been taken advantage of by the wide bunkers being so disposed as to afford side protection, and it is claimed that the last two ships should be able to stand a considerable amount of hammering from such opponents of their size as they are likely to meet in action.

The nature of the increased protection in the "Rostocks" is uncertain, but this allotment of displacement to armour in vessels of this size marks a new era in small cruiser construction; it must be remembered that the classed "armoured cruisers" of the "Yorck" type have only 4" belts although of double the displacement, and it is clear that the German designers intend to evolve a cruiser that shall be capable of meeting our new "Town" class on equal terms.

The armament of twelve 4·1" and two 21" torpedo tubes is, of course, too light to pit against the nine 6" of the "Lowestoft" class, and that this is recognised is shown by the criticisms which have been directed against the ships on this score; the officially inspired paragraphs which have appeared in the German Press in reply hint that this defect will be remedied in the next ships, and it is reported that ten 5·9" guns will be mounted on a disposition which will allow of all being trained on either beam. Another suggestion put forward with some authority is that the moderate dimension cruiser will shortly re-appear, with an armament of 8·2" guns. Certainly the small deck



Plan of German Cruiser *Stralsund*.

German Cruiser *Stralsund*.

protected ship is doomed until such a time as the destroyer grows up to cruiser size.

The machinery fitted differs in the various ships, the types of turbines being as follows :—

Name.	Turbines.	Builders.
Magdeburg.	Bergmann.	Weser, Bremen.
Breslau	A.E.G. (Curtis).	Vulkan, Stettin.
Stralsund.	Bergmann.	Weser, Bremen.
Strassburg.	Parsons.	Wilhelmshaven.

Steam is generated by twenty Schulz Thornycroft boilers, and with the designed H.P. greatly exceeded on trial, some excellent speeds have been put up. The *Stralsund* and *Strassburg* have both exceeded 28 knots—28·28 are the highest figures to hand—and the rest have proved faster than their legend speed. On trial all had bilge keels, except the *Stralsund*, and proved excellent sea-goers; but the latter rolled so alarmingly that a return had to be made to dockyard hands for keels to be fitted. Without them, however, and in a rough sea she made 28 knots. The *Rostock* and *Karlsruhe* will probably reach 29 knots.

It is interesting to compare these with their opposite numbers in our own Navy. It will be borne in mind that at present we have the "light armoured cruisers" and "small cruisers" under construction, and whether the former or the latter are to be perpetuated is uncertain. The *Nottingham*, *Birmingham* and *Lowestoft* displace 5,400 tons and carry nine 6" and four 3 pdr. guns, with two 21" submerged torpedo tubes. On 22,000 designed H.P. they are expected to exceed 24·75 knots and carry 650 tons of coal normally, with a maximum of approximately 1,000 tons. They are, however, unarmoured except by the usual protected deck, so that where the German ships score is on their defensive qualities and some excess of speed. Our ships, however, have a far heavier battery and on the whole are more likely to be winners of a duel on that account.

As regards the new British "armoured" light cruisers, no official—or even probably correct—details are known, so that any comparison is out of the question at present.

Germany's policy in regard to small cruiser construction is not very clear. She has now a total of thirty-six vessels of this class—from the old *Freya* onward—but not half are kept in constant commission. Possibly she is realizing that fact which we have long since recognised, *viz.*, that "wireless" has to a great extent replaced cruisers for fleet work, and that to-day the rôle of such ships is that of mother-ship to destroyers, or as a protection against destroyer attack. For that reason we have commenced construction of the "light armoured cruisers."

It will be interesting to see whether the moderate sized armoured cruiser does come into fashion again over the "other side," and if so, what *raison d'être* is to be allotted to such craft. In any case they would seem to be on the horns of a dilemma; either their speed will be below that of our light "A.C.s," or else they will fail before the heavier gun power of our older armoured cruisers, or battle cruisers. The naval needs of England and Germany are practically identical so far as the types of ships required are concerned; either we are wrong in dropping the medium cruiser, or else Germany is in fault by continuing their construction. *Qui sapit ?*

The Society of Engineers.—The Council of the Society of Engineers (Incorporated) announce that arrangements are being made for holding the Fellowship Examination of the Society during the second week of June next. Intending candidates should apply to the Secretary of the Society, at 17, Victoria Street, Westminster, S.W., for full particulars.

NAVAL MATTERS PAST AND PROSPECTIVE.

(From our own Correspondent.)

Portsmouth Dockyard.

THE visit of King George to the port on February 5, for the purpose of bidding farewell to the *New Zealand* and inspecting the progress of work in the yard, has naturally been the event of the month. It is always a pleasure to the inhabitants of Britain's premier naval arsenal when the King visits their town, and their only regret is that he does not drive through the streets from the railway station that more of them might see and welcome him. On this occasion his stay was so brief that such a course could not be taken, but the opportunity was made for his Majesty to have a look round the yard. There is no doubt that King George likes to get a personal knowledge of what is doing in the dockyard when a chance is afforded him. Since he was last here in 1910, there have been several improvements and alterations in the establishment, of which the more important are the two new locks or docks known as "C" and "D." The former is now nearly finished, and should be opened soon, while the latter will not be long behind it. No. 14 dock is also being lengthened, as well as one of the building slips not now in use. A good deal has been done also in the way of bringing up to date the plant in the yard, and alterations in this respect were no doubt pointed out to his Majesty. The new floating dock built by Messrs. Cammell, Laird & Co. is another addition. It has been placed in position in Fountain Lake since the King was last here, and at the time of his visit the *Hindustan* was in it, having taken the place of the *King George V.* In addition to the Admiralty representatives, the King was accompanied on his tour by Sir James Marshall, the director of dockyards, and the yard officials. His Majesty went on board the *Queen Elizabeth* and the *King George V.*, and the *Iron Duke* was also pointed out. He also paid brief visits to the floating dock and to the new lock, which it had been reported would be opened in his presence did time permit. In addition to the ships building and completing, the *Hindustan* has been placed in the floating dock since our last report. The *Superb* has also arrived for refit and to be supplied with wider bilge keels. The *Dreadnought* also came in for her annual refit on the 9th. The *Renown*, which paid off here towards the end of last month, will, it is understood, be fitted out at a receiving ship and stationed at Cromarty, where she will be used as a floating barracks for the marines who are to garrison the forts which are being built there. It has often been proposed that marines should be used for this purpose, but this is the first time that such a thing has occurred in this country. Some satisfaction is felt that the *Renown* should have been chosen for this purpose instead of being used as a target ship, as was at first reported. The *Achilles* and *Cochrane* have both left, but there is a considerable amount of work in the shape of repairs still in hand. Even such a small matter as the collision of a torpedo boat with a submarine, which occurred recently, brings a certain amount of work, and in this case the torpedo boat was rather badly damaged below the water-line. Of the yachts, the *Victoria* and *Albert*, after carrying out a satisfactory steam trial, was berthed at the South Railway Jetty to complete for the King's use, and some minor repairs having been carried out in the *Enchantress*, she has been away on a visit to Dundee and the north-east ports. The screw steamer *Tabaristan*, which has been purchased for Admiralty purposes, has arrived and is to be fitted as a depot-ship for the Fleet. She will be fitted with repairing shops and all the usual plant for making good minor defects. There are no signs of a cessation of overtime, and although there is a scarcity of shipwrights, and for some repairs these workmen have been withdrawn from other work and the entry of others is still open, upwards of 14,000 men are employed in the yard.

Devonport Dockyard.

It was hoped that the King would pay the *New Zealand* a visit at this port, and some disappointment was experienced when it was announced that the visit was to be paid to Portsmouth instead. Devonport would have been much pleased and gratified by such a visit, but it is fully realised that Portsmouth has the advantage of being closer to the Metropolis, and that his Majesty is a very busy man. It is six years since the King, when Prince of Wales, came here to open the Keyham extension works, whereas he was at Portsmouth less than three years ago. Had his Majesty come, as was expected, he would have found that there has been considerable progress and development in the western yard since his last visit. It has been suggested locally that His Majesty be asked to honour the port by a visit when the *Warspite* is ready for launching, and if he should come he is assured of a hearty welcome by his loyal west countrymen. Among the new work which has just come into the yard is that of converting the purchased merchant ship *Knight Companion* into a repair depot. Rumour has it that she is going to Cromarty, but it is more likely that she will be used with one of the battle fleets. From the preparations made, it is clear that her workshops will be of large capacity and provided with all the necessary plant for undertaking repairs to boilers and turbines, as well as dealing with the many small defects which cannot well be carried out in the ships themselves, especially after a collision or grounding. We have had as visitors two Dominion ships, the *New Zealand*, a fine battle cruiser, reminding us of the *Indefatigable*, which was built here, and the *Melbourne*, one of the Australian cruisers, built by Messrs. Cammell, Laird & Co. The latter vessel, the first of the ships built in this country at the charge of the Commonwealth Government, left for Australia *via* the Suez Canal on January 29. The *Australia*, the Commonwealth battle cruiser, a sister to the *New Zealand*, is expected here on February 20, from Clydebank, to be docked before carrying out gun and torpedo trials. The reconstruction of the *Centurion*, which, as explained last month, had been rendered necessary by a collision in the Channel, has been completed, and she has been undocked and made ready to resume her gunnery and steam trials. The *Conqueror*, *Orion* and *Temeraire* are also in hand. The first-named has had defects in her turret gun machinery remedied, and by the time these lines appear is due to have joined the Fleet. The torpedo repelling armament of the *Orion* has been given protection by means of casemates which do not interfere with the arc of fire and allow of considerable concentration either right ahead or astern or on the broadside. An improvement has also been effected in the fire-control platform, giving more space for the gunnery officer's appliances. Her refit trials with a new type of propeller have also given very satisfactory results. The *Indefatigable* is also to have her fire-control platform enlarged and the torpedo repelling armament provided with steel casemated gun-houses like those in the *Orion* and other early "Dreadnoughts." The *Temeraire* will undergo the usual refit, which will overlap that of the *Lion*, although this latter vessel should be out of hand shortly. The *Essex*, one of the ships of the newly-constituted Fourth Cruiser Squadron, which will also include the *Suffolk*, *Berwick* and *Donegal*, will not be ready as soon as her sisters, because it is likely that her funnels will have to be removed.

Chatham Dockyard.

The Prime Minister and the First Lord of the Admiralty arrived here quite unexpectedly on February 3rd. It appears that the weather made a visit to Cromarty Firth objectionable, and that therefore on the return voyage, instead of going to Portsmouth, it was decided to come here and finish the journey by train. The Admiral-Superintendent took the visitors round the basins and locks, but it is such a short time since Mr. Churchill was here that he must have had a very good knowledge of what there was most interesting to see. The *Indomitable*, battle cruiser, the *Chatham* and *Lowestoft*, light cruisers,—the former completed and the latter building—the scouts *Foresight* and *Forward*, which are to have their guns changed, several destroyers, and last, but not least, the four new submarines all came in for a cursory inspection, as well as some of the workshops and factories. The differences between the *Chatham*, *Lowestoft* and *Arethusa*, light cruisers, were doubtless pointed out. The *Lowestoft*, which is showing signs of the work and overtime put into her lately, will be broader than the *Chatham* and of about 50 tons more displacement. She will also be armed with an additional 6-inch gun. What displacement the *Arethusa* will have has not been divulged, but she will be over 400 feet long, and is expected to have a speed of 29 knots, or four knots more than the designed speed of the City class. The

armament will be the same as in the latter type, and the *Arethusa* will also have an armoured belt. The *Lowestoft* is to be launched about the second or third week in April, and it is anticipated that another light cruiser will at once take her place. The inhabitants would like such a ship to be named *Rochester*, but for the present the practice of giving names of cities to cruisers appears to have been dropped. The official explanation is that it is inexpedient to give warships names which might lead to confusion with harbours or naval bases, and as it would be unfair to select the names of inland towns whilst ignoring those of ports which had an actual connection with the Navy, another system of drawing upon the names of old frigates has been decided upon for the light cruisers. As was stated last month, the programme of refitting work shows no falling off. The *Indomitable* and *Natal*, as expected, have arrived, and both vessels will be here about a month for their annual refits. The *Indomitable* will ultimately proceed to the Mediterranean, but is temporarily attached to the First Battle Cruiser Squadron in home waters until the Third Battle Squadron returns from Malta. The *Natal* came here on returning from her voyage to New York with the body of the late Mr. Whitelaw Reid, on which she had a very rough passage. The *Hyacinth*, having completed her refit, was commissioned here on February 11th with a Portsmouth crew, and has since left for the latter port to prepare for her duties as flagship at the Cape of Good Hope in place of the *Hermes*. The *Berwick* has also had defects made good, and will join the Fourth Cruiser Squadron. The scout Patrol, paid off here last summer, has gone to Haulbowline to have her armament changed and her boilers retubed, and the destroyers *Zulu*, *Viking*, *Nubian*, *Cossack*, and indeed all the boats of the Fourth Flotilla except the *Maori* have also left, while other boats of the Third and Ninth Flotillas have arrived to take their places.

Sheerness Dockyard.

An item of news which has created a great deal of interest is the reported intention of the authorities to transfer the War College to Harwich. Probably there are more officers there who could take an interest in the war games than there are here, and we have a War College near by at Chatham, so it may be that there is some truth in this rumour. What we should not like to lose is our Flying School, but there is no chance of that, and the keen flying men who are attached to the *Actaon* would be the first to raise objections. At the conclusion of last month the first squadron of four aeroplanes, flying as a unit, made a voyage to Dover, each machine with a passenger. The trip was most satisfactory. It is a little curious to note how almost every class and grade is represented in the Naval Wing. There are lieutenants and sub-lieutenants of the regular service, of the Royal Naval Reserve, and the Royal Naval Volunteer Reserve, as well as engineers, assistant paymasters, and officers of the Royal Marines. The lower deck, by petty officers, engine-room artificers, and seamen, is also most creditably represented. In fact, when all the difficulties and shortcomings in regard to material are taken into account, the staff at Eastchurch will compare favourably with any similar body of airmen. Looking afloat, there have been many changes in the ships in port. Since the end of January, the *Africa*, of the Third, and the *Queen*, of the Fifth Battle Squadrons have arrived, and several other big vessels have passed through the harbour. There has also been a constant succession of small craft, but the spring exercises will make a clearance shortly. Work in the yard is brisk, for in addition to other small craft, there are three submarines under repair, and the *Jumna*, once a spick-and-span trooper, but now a coal hulk, is to be docked and prepared for transfer to another port, which rumour says is Cromarty. The division of mine-laying vessels attached to the *Nore* returned here on February 13th, after their cruise to Portland for exercises with the battle squadrons. On the same day that they began their cruise, ten days earlier, the battleship *Vengeance* also left the port on her first cruise as sea-going gunnery training ship at the *Nore*, in which capacity she had replaced the *Jupiter*.

Pembroke Dockyard.

The oil fuel transport ship *Trefoil*, which was begun here last month, will be a bigger vessel than was at first supposed, for she is to be nearly 300 feet long and to be capable of carrying 2,000 tons of oil. The most interesting fact about her, however, is that she is to be fitted with internal combustion engines, and the experience gained with her cannot fail to be of the greatest advantage to the Navy. Although only laid down on January 15th, she is already making good progress. The oil fuel tender of 500 tons displacement, which was begun on February 6th on the same slip as the *Trefoil*, will be finished much quicker, and indeed she must be in order to afford space for the completion of the larger vessel. There are no signs as yet of the sister to the *Trefoil* which we expect here. Meantime, attention has been directed to the *Amphion* by her return from the Clyde after a satisfactory trial both as regards power and speed. The highest speed she attained on the measured mile was about 26 knots, and the average for the eight hours' full-power trial 25·4 knots, the designed speed being 25 knots. Unfortunately, she broke one of her propellers and will have to be docked to enable it to be replaced. For the present, however, this cannot be carried out, as the *Nith* and *Ness*, destroyers, are in the dock, having their boilers retubed and the under-water parts of the hulls examined, and other defects made good. When the new slipways to which reference was made last month are completed, it will not be necessary to put the destroyers in dry dock, unless it is available, in which case more destroyers can be taken in hand at the same time, of course. Although there are pessimists who appear to contemplate the time when this yard will cease to carry on building work, there are no immediate indications of such a policy coming into operation, with three vessels under construction and the promise of another. When the *Nottingham* is launched in April next it is fairly certain that she will be followed by another light cruiser. We had a little excitement on Feb. 11th, when four torpedo gunboats made a night attack on the harbour in order to afford the local garrison artillery some experience in the forts. Some interest was aroused by the report that the Germans had adopted an aerial torpedo, to be fitted in a number of small ships each costing about one-twentieth of the sum for which a "Dreadnought" can be built. There are those who remember the trials which were made some years ago of such an appliance at Dale Head, trials which resulted in the rejection of the aerial torpedo as of no value for the British Navy, nor for land defence. It remains to be seen whether the reported German invention will have any greater success.

FLOODING OF A GRAVING DOCK.

DURING the height of a storm, accompanied by an abnormal tide, early on the morning of February 8th, an extraordinary occurrence took place on the Clyde, in that the graving dock at Elderslie, belonging to Messrs. Barclay, Curle & Co., was suddenly flooded, and to such an extent that a steamer of 6,000 tons, 415 feet in length, then in dock under repair, was lifted from the blocks and canted over on her side, while, more disastrous still, three workmen were drowned. The cause of the accident is still a matter of conjecture, but it is believed that the pressure produced by the exceptionally high tide forced the dock gate upward, and that the water rushed in underneath the caissons. The dock gate, it may be explained, consists of three transverse caissons. When a ship has entered the dock the caissons are floated across the entrance and sunk, one on the top of the other, until they form a complete wall on a level with the other side of the basin. When the caissons are sunk across the entrance they are kept in position by their own weight—each having a hollowed interior into which water is pumped or withdrawn as the caissons require to be either sunk or floated—and the pressure of the water in the channel outside. From the nature of their construction and the principle on which they are operated it is supposed that caissons of this type become more secure as the pressure of the water on the outside increases; but in this case it is believed that the excessive pressure of the water had a disturbing effect on the caissons. Had the water come in other than underneath the caissons it is regarded as extremely improbable that the gate would have righted itself automatically as it did at the turn of the tide. A searching official enquiry into the cause of this most unusual occurrence is about to be made.

FOREIGN NOTES.

Greece.

The Government has placed an order for a battleship of 19,500 tons, with the Vulkan shipyard at Stettin, Germany, in the place of the originally ordered armoured cruiser of 12,500 tons, and in addition three destroyers of 125 tons, to have a speed of 25 knots. Three similar destroyers have been ordered from the Germania shipyard, Germany. The Chinese armoured cruiser *Tschao-Ho*, of 2,500 tons and 21 knots, has also been acquired by the Greek Government. A submarine boat of 600 tons has been placed with the Schneider Company at Creuzot.

Austria.

The Admiralty has placed an order for a floating dock of 40,000 tons lifting capacity with the shipyard of Blohm and Voss, at Hamburg.

The passenger and cargo steamer *Marienbad*, built to the order of the Lloyd Steamship Company, has been successfully launched at the San Rocco shipyard. The *Marienbad* is of 12,000 tons capacity and has engines of 7,500 i.h.p. The *Marienbad* is to run on the Trieste-Bombay service, and is fitted with the most approved appliances for voyages in the tropics and is fitted with wireless apparatus.

France.

The Ateliers et Chantiers de Bretagne are just laying down the keel of the steamer *Blavet* for the Société des Charbons Le Prise at Lorient. The *Blavet* will be a cargo steamer of 1,300 tons carrying capacity and will have machinery of 780 i.h.p. This yard has also two screw tug boats in course of construction to the order of the Suez Canal Company, and has just completed the cargo steamer *Saint Marc* to the order of the Compagnie Charbonnière, which is to run between Cardiff and St. Nazaire for the transport of coal.

The cargo steamer *Saint Barnabe* has just been launched by the Ateliers de France, where she has been built to the order of the Société Navale de l'Ouest at Havre. Her length is 107 m., beam 16 m. and her carrying capacity 800 tons. The *Saint Barnabe* has been constructed for the transport of wine between Rouen and Algeria, and for this purpose is specially equipped with cranes and derricks to deal with the cargo. The engines develop 3,000 i.h.p. The vessel is fitted with all modern appliances.

The Compagnie Francaise de Navigation has just been formed in Paris with a capital of 4½ million francs and is about to order four cargo steamers of 4,000 to 5,000 tons. These steamers will run on services between France and England and between the Mediterranean and the Black Sea.

The completion of the mail steamer *Theodore Mante* is being rapidly pushed forward at the Chantiers of La Seyne, where she has been built to the order of the Compagnie Mixte of Marseilles. When completed the vessel will go on her trial runs, when it is expected she will easily attain the contract speed of 17½ knots.

The mail steamer *Gallia* it is expected will be ready for sea in about three months' time.

The Société Dunkerquoise has just taken over a new tug steamer the *Nord*, of 450 i.h.p., built to its order at a Dutch shipyard at Alblasserdam. At the Dutch shipyard there are several other tug boats in course of construction for the same company.

The Norwegian steamers *Hispania*, of 1,100 tons, and the *Salstad*, of 2,000 tons, have been purchased by a French shipping firm for service between Marseilles and Madagascar.

Germany.

The cargo steamer *Hubertels*, built to the order of the German Steamship Company Hansa, at Bremen, has been successfully put through her trial runs, after which she at once started on her maiden voyage to the Far East. She has a carrying capacity of 9,000 tons and a speed of 11½-12 knots. Her machinery is of the triple-expansion type and developes 2,500 i.h.p.

The tank steamer *Bavonne*, of 3,294 tons, has been sold to Italy.

The giant steamer *Imperator* is to start on her maiden voyage from Cuxhaven to New York on the 7th May. At the end of April the *Imperator* is to go through her trial runs at sea and it is reported that the Kaiser will witness them. The sister ship of the *Imperator*, now building at the Blohm & Voss shipyard and which is to be named *Europa* has somewhat larger dimensions than the *Imperator*.

The *Memphis*, a cargo steamer of 12,200 tons, built to the order of the German steamship company "Kosmos," at Hamburg, was successfully launched at the Tecklenborg Shipyard. Her length is 149 m., beam 18·5 m. and she is to be fitted with a triple expansion engine of 3,700 i.h.p., developing a speed of 12 knots.

The Norddeutsche Lloyd has placed orders for two large cargo steamers with the Tecklenborg Shipyard at Geestemunde and also for two further large cargo steamers with the Flensburg Shipyard.

The Bremer Vulkan at Vegesack has also received an order for a large passenger steamer from the same company.

The Hamburg-Bremen Africa Line has placed an order for a cargo steamer of 6,000 tons with the Neptunwerft at Rostock. The Reiherstieg shipyard at Hamburg has received an order from the German East Africa Line for a twin screw passenger and cargo steamer of 7,500 tons.

The cargo steamer *Alda*, of 11,000 tons, built to the order of the Roland Line at Bremen, has just been launched at the Tecklenborg shipyard at Bremerhaven, Geestemunde. The *Alda* is to be fitted up with all modern appliances for handling cargo expeditiously. The quadruple-expansion engine of 3,800 i.h.p. will give the *Alda* a speed of 12½ knots.

The *Irma*, a cargo steamer of 2,000 tons, built to the order of a shipping firm at Stettin, has been successfully launched at the Nüske shipyard at Stettin. The *Irma* will have a speed of 10 knots.

The *Arthur von Gwinner*, a petroleum motor vessel of 5,000 tons carrying capacity, built to the order of the German Petroleum Company at Berlin, was launched at the Frerichs shipyard at Einswarden. The Diesel motor develops 2,000 h.p., and the speed of the vessel will be 10 knots. The cargo space is divided into 10 oil-tight compartments.

United States.

The Admiralty orders for submarines have been distributed as follows: Three boats with the Lake Torpedo Company, these to have a displacement of 565 tons each. Five boats with the Electric Boat Company; the price of the boats varies from 535,000 to 565,000 dollars. The Admiralty has also decided that all the battleships and cruisers are to be supplied with hydroplanes, which are to be completed before the commencement of the summer manœuvres.

The *Washington Irving*, built to the order of the Hudson River Steamboat Company, at New York, was successfully launched at the shipbard of the New York Shipbuilding Company at Camden, N.J. The vessel is a passenger paddle steamer of large dimensions. The deck of the *Washington Irving* has room to accommodate 1,000 passengers, her certificate, however, being for a total of 6,000 passengers.

Turkey.

The Turkish Bagdad Railway has placed an order for 17 cargo barges with the Rushof shipyard at Mayence. The boats will be delivered in sections and assembled at their destination.

Holland.

Two large cargo and passenger steamers have been launched, the *Melchior Treu* at the Feyenhoord shipyard at Rotterdam, and the *Van Neck* at the Niederland shipyard at Amsterdam. The *Van Neck* is destined for the Dutch India service.

"TITANIC" ENGINEERING STAFF MEMORIAL.

The progress of this fund is shown by the following figures, which have been kindly supplied to us by the Hon. Sec. of the Committees:—

Institute of Marine Engineers, London, up to February 24th	£2,804 13 10
Southampton Committee (for the erection of a monument in Southampton), up to February 22nd	£1,682 0 0
Liverpool Committee (for the erection of a monument in Liverpool), up to February 22nd	£5,220 16 10
Total	£9,707 10 8

MR. WM. BOYD.

MR. WM. BOYD, who has held the position of Manager of the Shipbuilding Department, at Messrs. Cammell, Laird and Co.'s Birkenhead Works since 1907, has recently left to assume a responsible position with Messrs. Swan, Hunter and Wigham Richardson, Ltd., of Newcastle-on-Tyne. Before coming to Birkenhead, Mr. Boyd was for some time the General Manager of Messrs. Workman, Clark & Co.'s yards at Belfast, and upon leaving these yards Mr. and Mrs. Boyd were the recipients of a handsome presentation. A man of sterling business ability and acumen, Mr. Boyd at the same time possesses the courtesy of the true gentleman to all with whom he comes into contact. Mr. Boyd is a member of the Institution of Naval Architects.

CLYDE MODEL ENGINEERING INSTITUTE.

FOR a number of years past there has been a strong feeling amongst apprentices and others engaged in the engineering, shipbuilding and electrical works of Govan and neighbourhood that facilities should be provided for practically carrying out theoretical ideas and inventions in the way of small-scale models, etc. Model engineering institutes have been established for a number of years past in London, Manchester, Newcastle and other centres, and with the view of starting one in the Govan district a number of prominent local gentlemen and enthusiastic apprentices and amateurs set a movement on foot which has resulted in the founding of the Clyde Model Engineering and Electrical Institute, with rooms at 12, Craigton Road, Govan. The Institute has been admirably equipped with lathes—mainly of Drummond Bros.' make—shaping, drilling, emery-grinding and other machine tools, all of which are driven from shafting actuated by motor from electric current taken from the public supply cables. The Institute is lighted by electricity and gas, and there are a drawing office, private testing rooms, etc. In every respect the rooms are well designed to encourage the inventive faculties of local students. The Institute, which was formally opened and the machinery started on February 15th, by Mr. Fred J. Stephen, one of the managing directors of Messrs. Alex. Stephen & Sons, shipbuilders and engineers, Linthouse, Govan, who is also one of the leading authorities on the scientific side of shipbuilding in the country, will be open every evening from 7 to 10 p.m. and on Saturdays from 3 to 10 p.m. While the equipment has been mostly presented, the Institute is intended to be largely self-supporting, members paying an entrance fee of ten shillings and an annual subscription of the same amount. Lectures by experts will form a feature of the new Institute

MR. JOHN McGOVERN.

MR. McGOVERN, who is shortly leaving the Birkenhead works of Messrs. Cammell, Laird & Co., to take up the position of naval architect to the Prince Line, has had a successful and brilliant career and is still a comparatively young man.

Serving five years as an apprentice with Messrs. Vickers, of Barrow, he completed a term of nine years with this firm, during which period he took part in the construction of H.M. ships *Juno* and *Vengeance*, the Japanese flagship *Mikasa*, the P.S.N. steamer *Ortona*, etc. For four years Mr. McGovern was with the London and Glasgow Shipbuilding and Engineering Co., during the building of H.M. ships *Monmouth*, *Cumberland* and *Roxburgh*.

After acting as assistant manager at the repair works of Messrs. John Shearer & Sons, Mr. McGovern secured the position of chief ship designer with Messrs. Alex. Stephens and Co., of Linthouse.

In 1907 he became chief ship draughtsman at the Tranmere yard of Messrs. Cammell, Laird & Co., and later was appointed chief draughtsman of the whole shipbuilding works.

Mr. McGovern passed through the Barrow and Glasgow Technical Schools with distinction, securing at the latter institution the bronze medal in 1904-5 and the silver medal in 1906, in the National Art competition for original designs in naval architecture.

The best wishes of a large circle of friends go with Mr. McGovern to his new sphere of work, and there is no doubt that he will continue a successful career in the profession to which he has already done credit.

TECHNICAL SOCIETIES.

ARRANGEMENTS are notified as below for the month :—

North East Coast Inst. of Engineers and Shipbuilders, Newcastle-upon-Tyne.—Annual Dinner, March 6th, King's Hall, Armstrong College. March 28th.

North-East Coast Inst. (Graduate Section).—March 15th, Lecture to be given in Sunderland by M. Ba-Gyaw, on "Transmission of Power by Chain Drive."

Inst. of Engineers and Shipbuilders in Scotland, Glasgow. March 18th.

Inst. of Marine Engineers, London.—March 3rd, "Recent Experiences of Babcock & Wilcox Boilers for Marine Purposes," by Mr. J. H. Rosenthal. March 5th, Ballot papers for office bearers and members of Council to be returned by this date. March 7th, Annual Meeting at the Liverpool Street Hotel, London, E.C., at 7 p.m. March 10th, Discussion on Fuel Test.

Liverpool Engineering Society, Liverpool.—March 5th, "The Blackstone Crude Oil Engine," by Mr. W. A. Simper, A.M.I.M.E.

Association of Engineers-in-Charge, London.—March 12th, Paper by Mr. Alfred E. Penn, on "The Province of the Engineer-in-Charge.

Manchester Association of Engineers, Manchester. March 15th, Annual meeting and election of members and officers.

Junior Inst. of Engineers, London.—March 12th, "Superheated Steam," by Mr. H. P. Bray.

Society of Engineers Incorporated) London.—March 3rd, Inaugural Address of the President, Mr. Arthur Valon.

Institute of Metals, London.—March 11th and 12th, Annual General Meeting in London, at Inst. of Mechanical Engineers, Storey's Gate, S.W.

Inst. of Civil Engineers, London.—March 1st, Students pay a visit to the Royal Albert Dock Extension (South), Port of London Authority.

The Inst. of Naval Architects will hold its annual meetings on March 12th, 13th and 14th, in the Hall of the Royal Society of Arts, John Street, Adelphi. The Marquis of Bristol will preside. The annual dinner will be given on March 12th, in the Grand Hall, Connaught Rooms, Great Queen Street, Kingsway. During the meetings the following papers will be read and discussed :—"Recent Developments in Battleship Type," by Alan H. Burgoyne, Esq., M.P.; "The Influence of Air-pumps on the Military Efficiency of Turbine-engined Warships," by D. B. Morison, Esq.; "Mechanical Gearing for the Propulsion of Ships," by the Hon. Sir Charles A. Parsons; "Compressed Air for Working Auxiliaries in Ships Propelled by Internal Combustion Engines," by W. Reavell, Esq.; "The Energy Systems accompanying the Motion of Bodies through Air and Water," by Professor J. B. Henderson; "The Calculation of Stability in Non-intact Conditions," by Professor W. S. Abell; "Notes on Modern Airship Construction," by Baron A. Roenne; "The Longitudinal Stability of Skimmers and Hydro-aeroplanes," by J. E. Steele, Esq.; "On Large Deck Houses," by J. Foster King, Esq.; "Methodical Experiments with Mercantile Ship Forms," by G. S. Baker, Esq.; "Launching Declivities for Ships, and their Influence upon Poppet and Way-end Pressures," by A. Hiley, Esq.; "Stresses in Stayed Cylindrical Shells," by C. E. Stromeyer, Esq.; "The Distribution of Stress due to a Rivet in a Plate," by Professor E. G. Coker, and W. A. Scoble, Esq.; "Stresses in a Plate due to the Presence of Cracks and Sharp Corners," by C. E. Inglis, Esq.

Arrangements are in course of preparation between the Councils of the Inst. of Naval Architects and the Inst. of Engineers and Shipbuilders in Scotland for a joint summer meeting in Glasgow, and it is expected that the meeting will be from the 24th to the 27th of June.

INSTITUTE OF MARINE ENGINEERS.—The following subjects have been set for the competition papers which are to be delivered at the Institute premises on or before Sept. 1st. *Associate Members*, "The economic use of coal on board the modern steamship." *Associates*, "The bilge and tank pipe arrangements in a modern steamship, setting forth the principal features and materials used, with sketches." *Graduates*, "The safety devices required in a modern marine boiler and machinery installations, with their functions and descriptions." *Open to all apprentices*. "The welding of iron and steel past and present methods." The examination for Lloyd's Register scholarship is announced to take place about the end of June or early in July. Two scholarships were awarded last year, one to an apprentice engineer in Greenock and one to an apprentice in Newcastle; the former is now attending at Glasgow University and the latter at the Durham College of Science, Newcastle.

THE "SNOWDON RANGE."

IN many directions the shipping community has united to do honour to those who brought the *Snowdon Range* safely into port after her unexampled and eventful voyage. The port of Newcastle was the first to have the opportunity of showing its recognition, and there all the members of the crew were entertained and presented with appropriate souvenirs of their adventure. Then on the 18th February the master and officers attended at the London office of the Salvage Association, when the master was handed a gold watch, bearing a suitable inscription, and a cheque for £400. At the same time the chief engineer and the first mate received cheques for £140 each and the other officers and men sums in proportion. The bravery and resource of the crew of the *Snowdon Range* is noticeable from the fact that they were an ordinary ship's crew of an ordinary British cargo vessel. They were no picked crew selected for their high physique nor were they volunteers called upon to undertake any exceptionally risky enterprise. In their ordinary work of taking their vessel across the Atlantic they fell in with an exceptional conditions of things and suffered terribly, but they set their teeth and determined, from the highest to the lowest that they would "see the thing through," and they did, though "the thing" itself proved to be a task of unexampled difficulty and prolonged hardship. It will be remembered that, as Sir Edward Beauchamp, the chairman of Lloyd's, pointed out in his speech at the presentation, they had repeated opportunities of saving their own lives by the abandonment of the adventure. Fourteen days after the loss of the rudder, when they had learnt the discomfort and danger of a prolonged stay in a rudderless ship in heavy weather, they refused the chance of being taken off by the *Westernland*. Then the *Welshman*, both on her arrival alongside and after a week's experience of the task of aiding them, besought them to come aboard and leave their vessel to her fate. But they hung on, and brought the ship and her valuable cargo—it is said to have been insured for no less than £90,000 into safety. Due notice was taken by the speakers of the incident off Daunt's Rock, when the sudden gale caused the salvors to leave them and they were being taken towards the rocks at the mouth of Queenstown harbour. At that moment the chance of getting the ship through must have seemed remote indeed, and there can be no question that it was only complete harmony and inter-working between those on the bridge and their comrades on the starting platform that brought the matter to a safe conclusion. The opening of the harbour could be seen, thanks to the searchlights of the forts, and, by the continual use of the engines, putting them ahead and astern as the crises demanded, the ship was at last enabled to drift broadside into the harbour. One is glad to think that the mercantile community is showing due appreciation of the way in which all these men did their duty, and one trusts that the incident will be remembered, not only for the promotion of master and officers, but also for that of the humbler members of the crew.

The Consolidated Diesel Engine Manufacturers, Ltd., of General Buildings, Aldwych, London, W.C., with works at Ipswich (in course of erection) and Ghent, have issued a report that many important contracts have been booked by the Company and its associates, Messrs. Usines Carels Frères. Messrs. Carels Frères are very busy with profitable contracts. The construction of the Ipswich works has not advanced as fast as was anticipated owing to various obstacles having to be overcome, but the structural work is now in course of erection.

directed the affairs of his department to maintain good relations amid the complexities of insurance, ownership and the public safety on the one hand and deck and engineer, officer and seaman on the other. His ripe experience stood many a political chief in good stead, for not a few Presidents of the Board have come and gone during his tenure of office, and many changes in shipping and in departmental *régime* passed through his hands, and in the forefront of everything the public safety was ever his chief concern. The lamentable disaster to the *Titanic* threw a vast amount of work upon his shoulders, and there is little doubt that the onerous duties he was called upon to sustain during the course of the enquiry, accompanied as it was by some of the unfair criticism and invective that has characterized some types of speakers and writers of recent years, had a serious effect upon his health and left him less able to cope with the illness which came upon him.

The many interviews we have had with the late Assistant Secretary leave a pleasant memory of his personality, and of his sense of justice in dealing with several critical points in connection with the business of his office, and where the spirit of equity prevailed over dogmatism or other elements antagonistic to such.

OBITUARY.

Sir Walter J. Howell.

WITH the regrets of the entire shipping community we have to record the death of Sir Walter J. Howell, assistant secretary to the Board of Trade and chief of the marine department, by which the Civil Service has sustained a severe loss and the mercantile marine been deprived of an able and courteous friend.

Until the day of his death Sir Walter Howell was at his post, and his untimely demise was quite unexpected. A severe cold had kept him from duty at his residence, Redlynch, Streatham Common ; he had suffered for a day or two, but a more acute form of his illness supervened, and he succumbed on the 29th January at the comparatively early age of 62.

Sir Walter Howell was educated at Longhborough and King's College, London, and entered the Board of Trade by competitive examination in 1873. In 1884 he was promoted to the Upper Division and subsequently acted as secretary to the Committee on the regulations for testing cast-steel anchors, to the Committee on Night Signals at Sea, and to the Committee on Life-saving Appliances ; he was thereafter private secretary to Sir Michael Hicks-Beach when President of the Board of Trade, and after a short interval in the railway department returned to the marine department in 1893, where after temporarily filling the post of assistant secretary he was appointed, with Mr. S. Rice, C.B., to inquire into the establishment of the Registrar-General of Seamen, and was promoted to be assistant secretary for the marine department in 1899.

With few interests outside the Board of Trade, Sir Walter Howell made a hobby of his business, few men were better versed in shipping matters or so much alive to all the multifarious interests concerned ; with rare courtesy and tact he

THE death of Sir William Arrol on February 20th, at his residence in Ayr, arouses thoughts of the works which he accomplished and the humble start he made in the West of Scotland. Prominently associated with his name are the Tower Bridge, the Forth Bridge and the Tay Bridge, and there are many other undertakings of lesser note which were carried to a successful issue. Born at Houston, Renfrewshire, in 1839, after a brief education he served in the mills of Messrs. Coats, Paisley, and with experience of the cult of a blacksmith he started a small workshop in Glasgow for boiler and iron work. From a small beginning he gradually developed a business and his genius directed him to bridge building, leaving records and memorials of his life work in different parts of the country. Sir William Arrol's name will shine in the annals of history with brightness and add lustre to the accomplishments of the leaders of engineering science.

The Merchant Service Guild Gazette.—We have received the February number of the "Guild Gazette," the organ of the Merchant Service Guild, which is published three times per annum, as a record of what has been accomplished by the guild in respect of raising the status, and improving the conditions and wages of Masters and Mates. The "Gazette" gives an epitome of the policy of the Guild, some eighty odd pages of letters, rates of pay, parliamentary business and items of general interest to the members. There are several interesting and noteworthy matters dealt with in the "Gazette," such as the hardship involved by the master of a vessel who has to defend himself in a Board of Trade enquiry regarding the loss of the ship, with the result that he is exonerated from all blame and the same applies to the engineer. It seems but right and just that the costs of defence when such is necessary, should not be borne by the man who is brought to task innocently. The question of sight tests bulks largely in the discussions of what ought and what ought not to be, and doubtless some course will be resolved upon to prevent undue hardships upon those who have fitted themselves for the duties of a navigating officer. Dock loads and the load line rules alteration of six years ago come into the light of discussion and criticism and probably most seafarers will agree that if safety has not been affected by the load line, comfort has been materially reduced. References to Sunday labour, frequently unnecessary, are made and the systematic moving of vessels on that day to save time, without regard to the crew, commented upon. There is a lack of reference to questions which well wishers look to the "Guild Gazette" to deal with in connection with the duties of masters and mates. There are other subjects besides those connected with grievances which might be interposed in its pages. Too much dwelling upon rights and privileges is not good for any class of men, and there is another side which may be considered with profit.

REVIEWS.

Evolution of the Internal Combustion Engine. By Edward Butler. London: Charles Griffin & Co., Ltd., publishers. 8/6 nett.

This book is the work of an engineer who has already written a very useful treatise on carburettors, vaporizers and valves. The purpose of the volume under review is the presentation in a clear and concise form, readily understandable by engineers and designers, of the basic principles underlying the construction and working of internal combustion engines. The author recognises in the most comprehensive manner that successful machines of to-day are very often the result of a compromise, owing to limiting factors which have an important bearing on the commercial production of the machine. In other words, the machine which can be considered a commercial and mechanical success is usually a judicious blend of practical craft and theoretical deliberation. The author has taken some considerable trouble to point out and explain many of the analogisms met with in motor design, and has treated in a forcible and graphic manner the relative power and weight values of multiple and single-cylinder engines, the ratio of mechanical balance and torque efficiency in engines with various crank and cylinder dispositions, together with the relative flywheel values required therefor. The subjects, which are of supreme importance in the matter of maritime propulsion now largely to the fore, have been carefully dealt with, such as the comparative values of various forms of distributing valves, governing methods, lubricating methods, vaporizing methods, ignition appliances, methods used for starting and reversing and systems for transmitting power. The book is profusely illustrated, there being no fewer than 187 illustrations with descriptive letterpress of 209 pages. The chapter dealing with motors with revolving cylinders as used in aeroplane work is very interesting and instructive, and, on the whole, the work is one of which every engineer dealing with internal combustion engine work should possess a copy.

A Medical and Surgical Help. By Wm. Johnson Smith, F.R.C.S., revised by Arnold Chaplin, M.D., F.R.C.P. London: Charles Griffin & Co., Ltd. Price 5/- nett.

This is the fourth edition of the work originally published in 1895, with the object of affording some help in the injury and disease occurring at sea and under other local conditions, in which there may be no possibility of obtaining professional assistance and stimulating an active interest in the instruction as to ambulance work. In the present edition the whole work has been carefully revised. Recent advances in the knowledge of the causation of diseases, especially those due to tropical conditions, have made it necessary to rewrite the portions of the original book dealing with these subjects. A useful addition is the inclusion of the new scales of drugs and medical and surgical appliances, issued by the Board of Trade in January, 1912. The present edition contains some 350 pages and 82 illustrations. It will be recognised that no ship should leave port without the information this book conveys.

The Gas Petrol and Oil Engines. Vol. II. By Dugald Clerk, D.Sc., F.R.S., M.Inst.C.E., and G. A. Burls, M.Inst.C.E. London: Longmans, Green & Co. Price 25/- nett.

The first volume of this work was published in 1909 and was the work of Mr. Clerk, and it was then promised that a second volume should be prepared to deal with the practical side of the question as apart from the thermo-dynamic side dealt with in the first volume. The work under review is the joint work of the two authors and the matter has been settled after careful discussion as representing the views of both writers. The aim has been to compare early and late constructions and to deal with the various problems which have arisen in the various types of engines since the "Otto" cycle was introduced in 1876. Taken broadly the work may be divided as follows:—Chapters I. and II. deal with four and two-stroke engines generally, their difficulties and the solutions of some of the problems involved. Chapter III. deals with ignition arrangement and sets out the development under which the electric has been shown to be the best. Chapter IV. deals with governors used on the Continent, in America and here. Chapter V. deals with gaseous fluids from solids, and Chapter VI. with liquid fuel, particularly in comparison with coal, and sets out the important conclusion that coal must be relied on as the main source of motive power. Chapter VII. deals with the early and late petrol engines, particularly as to power, weight and proportion. Chapter VIII. describes some recent petrol engines and the results of tests obtained from same. Chapter IX. is a very useful treatise on carburettors, a subject well worth every attention. Chapter X. describes heavy oil engines, from the Priestman type to that of the Diesel type. Chapter XI. deals with marine oil and gas engines, and shows us that the success of the Diesel engine has tended to cause the neglect of the marine gas engine proper. Chapter XII. deals generally with the future of internal combustion motors, and discusses some points of great importance. There is a very useful appendix on the acceleration of the reciprocating parts, a subject that has not received the attention it ought if wear is to be kept down and vibration reduced to a minimum. This work as representing the careful selection and compilation of matter with personal experience thereon by two such experts in the subject as the authors, is a valuable addition to public knowledge for those who are engaged in the subject.

Kempe's Engineers' Year Book, 1913. H. R. Kempe, M.I.C.E., etc. Leather, gilt, 12s. 6d. London: Messrs. Crosby Lockwood & Son.

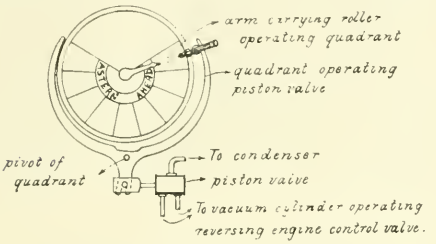
This excellent annual, which has had a run of successful issues, has now made its appearance for 1913, its twentieth year, and is the finest issue yet produced. Over 200 pages of fresh information have been included, the whole number of pages being nearly 1,600 and the illustrations about 1,300. Several new features have been introduced this year, among which may be mentioned chapters on "Legal Notes for Engineers," "Marine Diesel Engines" and a summary of engineering progress for the past year. Characteristic of this publication is the thoroughness with which the revision is carried out, no effort or expense being spared to make the book as complete and up-to-date as possible and of real practical value to engineers of every class in their work from day to day. The scope of the work is very wide, embracing all subjects for the engineer arranged in convenient form, and we can thoroughly recommend the publication to engineers as one containing a wealth of information and to which they will not refer in vain. The volume is produced in its usual excellent style and is a credit to all concerned.

Munro's Marine Engineer's Annual.—This useful marine engineer's annual, now in its 3rd year of issue and sold at 1s., is published by Messrs. James Munro & Co., Ltd., of 64, Howard Street, Glasgow, and not by Messrs. Jas. Brown and Son, as stated in our February issue.

ESPLEN'S PATENT CONTROL.

A very effective control, having for its object the positive action of the marine engine in accordance with the order so indicated on the telegraph, has been patented recently by Mr. Alec Esplen, of Liverpool. It can be operated both from the bridge and from the reply telegraph in the engine-room. The control may be operated by a variety of mediums, such as the condenser vacuum, or electric solenoids. In the case of electrical control the telegraph handle would act as the switch, thus putting in or cutting out the solenoids. In the case of the ordinary marine engine, the condenser forms a readily accessible means for operating the control. In this case a cam quadrant attached to and forming part of the operating telegraph lever causes the movement of certain levers, which in turn operate control piston valves. One of these piston valves controls the reversing engine, preferably of the Mactaggart Scott or Brown type, while another controls the throttle. The control piston valves have their central port open to the condenser while their outer ports are open in turn to the atmosphere or condenser. By movement of these piston valves one of two ports is either connected to the condenser or atmosphere. These ports are in turn connected to either end of vacuum cylinders containing pistons which in their turn operate either the reversing engine or throttle valve.

When the telegraph is in the stop position the throttle valve is automatically closed, while when the telegraph is moved from the "Slow ahead" to "Slow astern" position the throttle is also kept closed; thus steam is shut off while swinging the links. Many accidents have occurred through the order from the bridge being misunderstood, several indicators having been brought out, which in such cases ring a bell or give some other warning, or in normal conditions indicate the direction of rotation of the engines. Mr. Esplen's control gives an absolute assurance that the engines are



Esplen's Patent Control.

working as indicated. During the observation of the action of this control fitted to a small steamer and operated by condenser vacuum the engines being started in a reverse direction to that indicated on the telegraph, after one or two revolutions the engines reversed and at once rotated in accordance with the order on the telegraph showing the value of the control as a check on the engineer. Other remarkable demonstrations of the efficiency and reliability were carried out which at once proved the claims made for this remarkable control. Mr. Esplen is also the patentee of the Trident Firebar, which has been fitted to over 3,000 vessels.

Industrial and Trade Notes.

THE CLYDE AND SCOTLAND.

(From our own Correspondent.)

Shipbuilding output.—The Clyde shipbuilding output for January was very small, consisting of five vessels of 9,750 tons—scarcely equivalent to the tonnage represented in only one steamer of the size now considered medium. Last year the Clyde January output consisted of 39,526 tons, the highest on record, in 1911 it was 23,540 tons, in 1910 22,773 tons, and in 1909 21,430 tons. The present January output, however, is not the smallest on record, this negative distinction belonging to January, 1908, when eight vessels of only 1,969 tons were launched on the river. It is practically certain, however, that before the year is very far gone the adverse balance of January will be more than wiped off. The shipyards are all very busy, there are quite a number of large vessels to be launched within the twelve months as well as more than the average number of vessels of ordinary sizes and types.

Work in prospect.—While activity in placing new orders, like the launching of new vessels from the stocks, cannot be said to be very pronounced largely because the stocks at present are so much occupied, and conditions of smart delivery are precarious—enquiries are plentiful, and many of them are for vessels of the liner order, involving work for all classes of artizans. Estimates are at present being prepared by several Clyde firms—as well as by firms elsewhere for the building of the new Australian liner required by the Orient Steam Navigation Co. Five firms altogether have been mentioned as having been asked to tender, these being Messrs. John Brown & Co., Ltd., Clydebank, who built the *Orsova* and the *Orama*; the Fairfield Company, who built the *Otway*; Messrs. Workman, Clark & Co., Ltd., Belfast, who built the *Otranto* and the *Orvieto*; Messrs. Cammell, Laird and Co., Ltd., Birkenhead; and Palmers' Company, Jarrow and Hebburn-on-Tyne. The new vessel, it is understood, will generally speaking be similar to the *Orama*, the latest addition to the Orient fleet, which was turned out by Messrs. Brown & Co. about a year and a half ago. This liner it may be recalled, is 550 ft. b.p., by 64 ft. by 42 ft., and 13,000 gross tonnage, she has accommodation for about 450 first and second-class passengers, and over 630 third-class, while three of the holds and one of the 'tween deck spaces forward are insulated. The propelling machinery consists of a combination of two sets of 4-cylinder triple-expansion engines and a low-pressure Parsons' turbine, the latter driving the centre one of the three screw propellors. Other vessels of large tonnage for which tenders are being asked from Clyde, as well as other builders, include one of considerable dimensions and good speed for the Austrian Lloyd Company of Trieste, whose two new twin-screw steamers of 12,000 tons and 17 knots speed—the *Glablonz* and *Marienbad*—have just inaugurated that Company's service between Trieste and Bombay. Other vessels contemplated and being arranged for include a 550 ft. passenger and emigrant steamer for Messrs. Embiricos Brothers (The National Steamship Company), several fairly large steamers for the British India Steam Navigation Company, and one or two steamers for Italian companies.

Messrs. John Brown & Co., Ltd., Clydebank, have arranged to launch the leviathan Cunard liner *Aquitania* on Monday, 21st April, and the naming ceremony will be performed by Lady Derby. No authentic information has yet been given as to the dimensions of the new Cunarder, but there will be little between her and the German *Imperator*, the tonnage of each being in the region of fifty thousand tons. To launch a vessel of these dimensions on such a narrow river as the Clyde is a great achievement, and in being able to do so Messrs. John Brown & Co. recognise the work of the Clyde Trust, to which body they voluntarily made a gift of £10,000 towards the cost of deepening and widening the river. Messrs. Brown & Co. contributed to the output of January the only warship of the month, the British torpedo boat destroyer *Ambuscade*, of 935 tons displacement, with geared turbines of the Parsons type, of 24,500 shaft horse-power. On February 17th, *H.M.S. Australia*, the Commonwealth's first battleship, left Messrs. Brown & Co.'s fitting-out basin, and after coaling at the tail-of-the-bank, proceeded down the Firth and adjusted compasses. The *Australia*, with a selected crew on board, left the Clyde on February 20th for the South of England to undergo official and other speed trials.

The directorate of Messrs. William Beardmore & Co., shipbuilders, engineers, steelmakers and ordnance manufacturers, of Parkhead and Dalmuir, Glasgow, has been joined by Colonel J. Smith Park, M.V.O., late managing director of the Allan Line, who retired from the latter firm in August of last year. He is the managing owner of the Park Line of steamships. The vacancy in the directorate of Messrs. William Beardmore & Co. was caused by the retirement from the board of Colonel O. C. Armstrong, D.S.O. Messrs Beardmore & Co., at their Dalmuir shipyard, are well employed with naval and mercantile tonnage. The three light armoured cruisers they have presently on hand for the British Admiralty are to be named the *Galatea*, the *Inconstant* and the *Royalist*. Quite recently the firm have put successfully through her speed trials the 8,000-ton twin-screw steamer *Willochra*, the third of three similar steamers which the firm have built for the Adelaide Steamship Company of Australia. She attained a mean speed of over 16 knots, loaded, including a run of 100 miles at sea, and fulfilled all contract conditions.

Scott's Shipbuilding & Engineering Co., Greenock, whose works have undergone extensions and improvements at intervals during recent years, still find it necessary to augment their working area and facilities, especially in view of the increasing amount of Admiralty work undertaken. The Company are at present in negotiation with the Greenock Harbour Trust for the acquisition of extra ground, to the extent of 22,000 square yards, in the vicinity of the James Watt Dock. Messrs. Caird & Co., Greenock, have of late been acquiring additional ground, and demolishing old buildings thereon, to enable them to extend and rearrange their shipyard primarily with a view to providing much longer building berths.

Messrs. Russell & Co. and Messrs. Dunlop Bremner & Co., whose shipyards adjoin each other at Port Glasgow, have

jointly undertaken, and already partly carried out, a scheme of dock construction from which each will benefit. They are prosecuting the scheme on enlarged lines, and are seeking powers to utilise a strip of land separating their works called Boundary Street, but which has never been used as anything but a means of access from the main street to the margin of the river. It has been arranged between the Town Councils of Greenock and Port Glasgow that if adequate compensation to the public is forthcoming they may be allowed to make use of the lower portion of Boundary Street. The stocks in Messrs. Russell & Co.'s yard, over a dozen in number, are all, as is usually the case, occupied with cargo steamers of large tonnage. Their latest order is for a large cargo and passenger steamer for a firm of owners in the Far East.

The Greenock and Grangemouth Dockyard Co., Greenock, have received an order from London owners for the construction of an oil tank steamer of about 10,000 tons carrying capacity and 11 knots speed. The machinery will be supplied by a Greenock firm of engineers.

Messrs. The Ailsa Shipbuilding Co., Troon, are reported to have received orders for several steamers, one of which is for the Bombay Steam Navigation Company, and one for the General Steam Navigation Company, London.

Messrs. Mackie & Thomson, shipbuilders, of Govan, who in the course of some months will have their name associated with the new yard being laid down for them at Irvine, put two new steamers of their construction through their speed trials in the same week on the Firth of Clyde. The vessels were the *Itaquna*, built to the order of Messrs. John M. Campbell & Son, Glasgow, for Brazilian owners, which attained a speed considerably in excess of contract requirements, and the *Wandana* owned by the West Coast Shipping Company, Adelaide, Australia, which exceeded by half-a-knot the contract speed of 11 knots. The machinery for both vessels was supplied by Messrs. Muir and Houston, Glasgow.

Messrs. George Russell & Co., Ltd., Motherwell, the well-known crane makers, have had their tender accepted by the Belfast Harbour Board for the construction at Alexandra Wharf of an electric derrick crane capable of lifting 120 tons, the price being £8,725. It will take 15 months to complete the work, and an additional expenditure of £1,300 will be incurred for the foundations and other necessary work.

The vast establishment of Messrs. David Colville & Sons, Dalzell Steel Works, Motherwell, has for a considerable time past been undergoing important extensions. With a view to making the Dalzell works one of the most important of their kind in existence, visits have been paid to and a study made of all the leading steel-making places in the world. On several acres of fresh ground additional shops have been laid down, and amongst new plant erected are smelting furnaces and bar and plate mills of large dimensions. When the additions are complete and the works are in full swing, as they are expected to be within a few weeks, the output will be increased by about 2,000 tons of steel per week. Broadly speaking the output of steel per annum will almost equal the entire shipbuilding output of the Clyde for the same period.

East Coast of Scotland Shipyards, shipbuilders on the east coast of Scotland—the Forth, the Tay, the Dee and minor centres—launched in January six vessels of 878 tons gross, of which the Dee and Moray Firth district contributed five vessels of 808 tons and the Forth one vessel of 70 tons, no vessels having been launched on the Tay. Of the Dee and Moray Firth productions three were steam trawlers ranging from 200 to 220 tons, and two were steam drifters, each about 90 tons. The trawlers were constructed by the John Duthie Torry Shipbuilding Company, Aberdeen; Messrs. A. Hall & Co., Aberdeen, and Messrs. Hall, Russell and Co., Aberdeen; while Messrs. George Innes & Son, Macduff, and the Thornbush Slipway Company, Inverness, were each responsible for one of the drifters.

Messrs. John Cran & Co., Leith, who launched at the end of January the steel-screw tug *Berta*, have a second and similar vessel on hand, both being to the order of the Antofagasta and Bolivia Railway Company, for service at Antofagasta. The vessels are 62 ft. in length, 15 ft. in breadth and 8 ft. in depth, and will be fitted by the builders with powerful engines, and with a large steam winch for lifting moorings and other heavy weights.

Messrs. Ramage & Ferguson, engineers and shipbuilders, Leith, who some weeks ago launched the steamer *Palmella*, of 1,350 tons, for the London and Portugal trade of the Ellerman Lines, Limited, a distinctive feature of which is a stern of the cruiser type, claimed to contribute to economy in propulsive power, have recently put the vessel through her speed trials with satisfactory results.

Messrs. James Abernethy & Co., Aberdeen, are busy on several sets of engines and boilers for new trawlers, the latest to be launched being a vessel of 130 ft. length, from the stocks of the John Duthie Torry Shipbuilding Company, Limited. The engines for this vessel will be on the triple-expansion principle.

Graving Dock at Inverkeithing.—A proposal to construct a graving dock at the East Ness, Inverkeithing, is now being discussed by the several bodies interested, and hopes are entertained of the project being carried out. Terms have practically been arranged with Lord Elgin, proprietor of the ground, subject to satisfactory conditions being got from the Town Council of Inverkeithing. The proposed dock provides for receiving vessels of 500 ft. in length. A channel is to be dredged to a depth of 26 ft. at high water, and a basin giving 8 ft. in depth at low water is also to be formed. A branch railway is to be connected to the old Dunfermline and North Queensferry line.

TYNESIDE AND WEARSIDE.

(*From our Own Correspondent.*)

Tyneside.

WORK on the river continues to be very plentiful, all the firms on both sides of the river having plenty of orders, and now that the shipyard agreement has been ratified, it is hoped that things will go smoothly, and allow orders to be completed without delay.

Messrs. Sir Wm. Armstrong, Whitworth & Company have secured the order for the "Dreadnought" presented to this country by the Federated Malay States. The vessel will be called the *Malaya*, and is to cost £2,250,000. It will be the first battleship built at the Company's new yard at Walker, which is nearing completion, and which consists of nine berths of the following lengths, 1,000, 900, 800, 650, 550, 500, 450, 400 and 350 feet. The equipment of the yard will be of the most modern kind, and when in full swing will equal any yard in the world. It is to be hoped the damage done to the works by the recent gale will not retard the work in any way. The firm have also in hand at the Elswick yard the Brazilian battleship *Rio de Janeiro*, the two Chilian "Dreadnoughts" *Almirante Latorre* and *Almirante Cochrane*, a Norwegian cruiser, and the British cruiser *Birmingham*. With the laying of the keel of the *Malaya*, it is probable that no single firm has ever had so many large war vessels on hand all at the same time.

The Wallsend Slipway & Engineering Co., Ltd., have in hand a large amount of work, amongst which is the propelling machinery for the battleship *Malaya*, which will be about 50,000 horse-power, and intended to drive the vessel 25 knots an hour. The firm have also secured the contract for the engines for the battleship *Queen Elizabeth*, the hull being under construction at Portsmouth Dockyard; these engines will be of similar power to those for the *Malaya*. The firm have made a speciality of turbine machinery for ships.

Messrs. Swan, Hunter & Wigham Richardson, Ltd., continue to be very busy and have all their berths occupied. It is stated the firm are after orders for the building of warships for the Canadian Navy, and are prepared to open a shipyard in Canada for that purpose. Mr. Hunter is over in Canada now and is supposed to be making arrangements with this view. The firm have placed the order for the construction of a large dry dock at Wallsend.

Messrs. Palmer's Shipbuilding & Iron Co., Ltd., have a considerable amount of work in hand and have all their berths fully occupied. A large amount of repair work is in hand owing to the recent bad weather.

Messrs. Smith's Dock Co., Ltd., are very busy in all their graving docks, and have a lot of repair work in hand, both in the docks and afloat.

The Northumberland Shipbuilding Co., Ltd., have all their berths fully occupied, and orders on hand to last them for some months to come.

Messrs. Brigham & Cowan, Ltd., have a lot of repair work on hand in the docks, as well as afloat.

Wearside.

Messrs. Wm. Doxford & Sons, Ltd., continue to be very busy, having in hand a large amount of new work, besides a good deal of repair work; they are also very busy in the engine shops.

Messrs. John Dickinson & Sons, Ltd., have several orders for engines on hand for a number of ships building on the river.

Messrs. J. L. Thompson & Sons, Ltd., have all the berths at their North Sands and Manor Quay yards occupied, and they look like having a record year.

Messrs. S. P. Austin & Son, Ltd., continue to be fully occupied, both with new ships and repair work, their pontoon and dry dock having been in constant use of late.

Messrs. MacColl & Pollock are very busy with sets of engines for ships building on the Wear, the Tees, the Tyne and abroad.

Messrs. Robert Thompson & Sons, Ltd., have a large amount of work on hand both at the shipyard, and repair work at the Bridge Dock, the latter having been kept very busy for a long time now.

Messrs. Osbourne, Graham & Co. are still very busy, and have all their berths fully occupied. They have orders on hand to last them a considerable time.

THE TEES AND HARTLEPOOLS.

(From our Own Correspondent.)

Middlesbrough.

Messrs. Sir Raylton Dixon & Co., Cleveland Dockyard, have sufficient orders on hand to keep them busy well into next year, though no new orders are reported during the month.

Messrs. W. Harkess & Sons, Ltd., continue to be very busy with both new and old work, and have secured the contract to build a small steamer for comparatively early delivery.

Messrs. Richardsons, Westgarth & Co., Ltd., have all departments busy, and they have secured the contract to supply the engines and boilers of about 900 i.h.p. for a steamer building by the Greenock and Grangemouth Dockyard Co. for Messrs. Furness, Withy & Co., West Hartlepool, similar to the s.s. *Pomeron*. They also continue very busy in their speciality departments.

Messrs. Smith's Dry Dock Co., South Bank, have new work to keep them busy throughout the year.

Stockton and Thornaby.

Messrs. Craig, Taylor & Co. have a sufficient amount of new tonnage to build to keep them very busy for some time to come.

Messrs. R. Ropner & Son are expecting to secure an order that is in the market for foreign account.

Messrs. Richardson, Duck & Co. are likely to secure a contract for which tenders are out in the open market. They have a good amount of work on hand.

Messrs. Blair & Co. have secured a contract to supply the engines and boilers for a steamer for Messrs. Pyman & Co., which will be built by Messrs. Irvine's Shipbuilding and Dry Dock Co., Harbour Dockyard, and is a repeat of one launched for the same firm last year.

West Hartlepool.

The Hasler S.S. Co. (Messrs. Furness, Withy & Co.), have bought the s.s. *Norman*, 1,840 gross tons, and rechristened her the s.s. *Saltburn*, thus replacing the one sold to Dutch owners.

Messrs. Furness Withy have sold the s.s. *Saltburn*, sister ship to the oil-engined steamer *Ercestone*, of 1,768 gross tons, to Dutch owners, who have rechristened her *Albergen*.

Messrs. W. Gray & Co., owing to the large number of orders on their books, cannot give delivery for over a year. Amongst the new orders are two large cargo steamers for Messrs. Strick, of London, to replace two sold to the Holland-Amerika Line for about £175,000. They are reported to have bought a large piece of land on the north side of the Tees for a shipyard, which has already been pegged off.

Messrs. Irvines' Shipbuilding & Dry Dock Co., Harbour Dockyard, are very busy in all departments; they are to build the second repeat order for a medium-sized cargo boat, a duplicate of the s.s. *Blackhead*, launched last year.

Messrs. The Central Marine of Messrs. W. Gray & Co., are quite full up with orders and have secured the contracts to supply all the machinery for the two steamers to be put down shortly. They are exceptionally busy in the drop forging department.

Hartlepool.

The recent gale has driven a large hole right through what is known as the Middleton Pier of the West Harbour; this will take a long time to repair owing to its very exposed position. A local firm, who have disposed of some of their old steamers are coming into the market for three new ones, which are likely to be replaced locally.

Messrs. Irvines' Shipbuilding & Dry Dock Co., Middleton Yard, have some very large ships on hand. They are reported to have secured the order for a repeat steamer, for Messrs. Pyman & Co., of one launched for them last year; it will be engined at Stockton by Messrs. Blair & Co.

Messrs. Richardsons, Westgarth & Co., Ltd., continue to be very busy in every department. Amongst the new orders on hand is a set of engines and boiler for the Heyn Line, of about 900 h.p., a repeat of those supplied to the s.s. *Blackhead*, but boilers of improved design; they are also very busy in the turbine department, having repeat orders for a 3,000 Kilowatt set for Hammerset and two sets for Hayle, Cornwall.

THE HUMBER AND DISTRICT.

(From our Own Correspondent.)

Grimsby and Immingham New Docks.—The shipping at Grimsby at the time of writing is held up, owing to the dock labourers being out again for an increase of wages. It is hoped that the differences will soon be put right, as in the meantime the trade of the port is in a dislocated state and inconvenience to the travelling public and business houses is being caused.

At a meeting of the chairman and directors of the Great Central Railway Co., held recently, the chairman alluded to the prosperous trade of the new Immingham Dock, notwithstanding the port being in its infancy. The coal trade was growing well, and the new buildings around the dock were well advanced and ready for work. The Company has arranged with the P. & O. Steamship Co. for sailings every month to the Far East. Everything seems very promising, and the Government are building large oil tanks for naval use and are seemingly making a naval base in the Humber to protect the East Coast. A wireless station is also being built by the Government at the Royal Dock entrance at Grimsby, and thus will be able to receive from and despatch wireless messages to the fleets in the North Sea.

Hull Docks.—During the last few days the Alexandra Dock authorities have been very busy dealing with wool cargoes from Australia. A very notable cargo to arrive at the port was that of the s.s. *Port Kembla*, her cargo consisting of 7,560 bales from Melbourne, 1,794 bales from Adelaide, and a further 733 bales from Sydney, making a total of 9,077 bales of wool. The port has a great future in the wool trade, steamers arriving every week from the Colonies. The rates on the rails from Hull to Bradford are insignificant compared with London as a distributing centre. There have also been a great number of steamers arriving from the River Plate and the Indian trades with grain, etc. The coal hoists around the various docks are kept fully employed shipping coal for all parts of the world, and the railway company's graving docks have been kept very busy with hull, etc., repairs to steamers.

Messrs. Earle's Shipbuilding and Engineering Co., Ltd., are keeping fairly busy with new and repair work, and the Company's patent slips are well employed, some of the ships undergoing extensive repairs thereon.

Messrs. Amos & Smith, engineers and boilermakers, are busy on new work, building machinery and boilers for trawlers,

etc. The shop machinery is at work night and day to compete with the orders booked. The outside staff are engaged in opening out boilers and machinery for Board of Trade and Lloyd's surveys, and the branch shop at Alexandra Dock has plenty of work for graving dock repairs, etc.

Messrs. North-East Coast Engineering Works (Hull), Ltd., have had a fair amount of work in hand during the month as follows: The R.M.S.P. *Parda*, building an iron house on poop deck for hospital purposes and fitting up the interior arrangements; s.s. *Brighton*, general repairs. Several other steamers have had repairs. This firm are in the position to take in hand all sorts and conditions of ship and graving-dock work.

Messrs. Stewart & Craig, engineers and ship repairers, have had the following steamers, amongst others, in hand undergoing, some of them, very extensive repairs on deck and engine room:—S.s. *King Horrell*, s.s. *Minna*, s.s. *Minecaster*, s.s. *Miranda*.

Messrs. Cooper & Co., Ltd., engineers and boilermakers, have had a very good month on a number of steamers opening out for surveys, etc., and on some very extensive repairs in the graving docks. The Company's own graving dock is fully booked up with small coasting steamers, some that have been in having undergone very extensive hull repairs. The Company's Neptune Works have also been fully employed in the boiler and moulding shops and engine works. Orders from home and foreign steamship owners for the Company's patent propellers are plentiful. The branch shop at Alexandra Dock has been fully employed on ships in that dock and in graving dock.

Messrs. Woodall & Co., engineers, etc., have been fairly well employed at the several docks on steamer repairs, and the smith's shop at the works on forgings for stern posts and stems for several small shipyards throughout the country, and for the L.C.C. Works, Hull Corporation Tramways and other departments.

Central Dry Dock and Engineering Co., Ltd., have had a fairly good month in their graving dock and had to engage the public docks belonging to the railway companies. Some very extensive repairs have been done on several steamers.

Messrs. C. D. Holmes & Co., Ltd., engineers and boilermakers, are very busy in the engine works and other departments. The Company's patent winches for trawl work and pumps, etc., are in good demand. They are now fitting boilers and machinery into new trawlers in the docks, and preparing for trial trips. The outlook is very bright.

Fish Dock.—The many small engine repair shops around this dock seem fully employed, some of the trawlers undergoing extensive repairs after being ashore at Iceland, and some through stress of bad weather in the North Sea. The patent slips on the dock are full up, some of the vessels undergoing Lloyd's survey.

Messrs. Cochrane & Sons, Ltd., shipbuilders, Selby, are very busy building trawlers, tugs, coasters and barges for various parts of the country; several trawlers are now fitting out with machinery, etc., and preparing for trial trips. The boilers and engines are built by Messrs. C. D. Holmes & Co., and Messrs. Amos & Smith.

SOUTH OF ENGLAND AND ISLE OF WIGHT.

(*From our own Correspondent.*)

Messrs. Harland & Wolff, Southampton, have the first-class torpedo gunboat *Skipjack*, and the gunboat *Spanker*, in their hands for general overhaul. They have just completed an extensive overhaul to the *Majestic*, and the vessel has taken up her position on the sailing list. The *Oceanic* has also undergone a general overhaul, and extensive alterations have also been carried out aboard and she will open the regular mid-weekly sailing by the White Star steamers. According to present arrangements the *Olympic*, *Majestic* and *Oceanic* will maintain the service. The *Beacon Grange*, which has been in the hands of the firm for some weeks, was discovered to be on fire, but the damage is not so serious as was at first anticipated. It will, however, necessitate the vessel dry-docking again, and she will not be ready for sea before the early part of this month. It is expected that the large French liner *La Savoie* will come here for repairs early this month.

Messrs. J. Samuel White & Co., East Cowes, Isle of Wight. The torpedo boat destroyer *Almirante Condell*, the second of the six vessels being built for the Chilian Navy, is now receiving her machinery and the first of the six vessels, the *Almirante Lynch* (late *Tomé*) will shortly be steamed. Sundry small boats have satisfactorily passed their trials and been delivered. The shops generally continue busy.

Messrs. Simpson, Strickland & Co., Ltd., Dartmouth, S. Devon.—The above firm have plenty of work on hand, including two 85 ft. steel motor barges, a 64 ft. steel tug, and a 63 ft. steel tug for South America. Two 50 ft. pinnaces for the Admiralty and two 32-ft. and two 31 ft. pinnaces for foreign Governments. A 60-ft. steel steam launch for the India Office and a high speed 50-ft. steel steam launch for foreign account. The above orders are in addition to a number for machinery only, and will keep the firm fully occupied for some time. A considerable amount of repair work has been completed during the month on ships in Dartmouth Harbour.

Messrs. Day, Summers & Co., Ltd., Northam Ironworks, Southampton. The 60-ton sheer legs for Messrs. S. Pearson and Son, Ltd., and the greater part of the machinery were shipped last month. The s.y. *Boadicea* was on the slip, and the s.y. *Conqueror* was dry docked. Both vessels are being reclassed, and a large number of shell plates have been fitted. The s.y. *Savonara* is also going through survey, and having her boilers retubed. Work is proceeding on the P.S. *Princess Beatrice* and P.S. *Princess Mary*.

Messrs. J. I. Thornycroft & Co., Ltd., Woolston Works, Southampton. Work is proceeding satisfactorily on the seven torpedo-boat destroyers for the Admiralty, and the *Paragon* was successfully launched at the latter part of last month. H.M. paddle tugs *Sturdy* and *Strenuous*. The *Sturdy* ran successful trials last month and good progress is being made with the second vessel. Work is proceeding on the Diesel-engined yacht, and on the passenger and cargo steamer for Trinidad. This latter vessel is to be named *St. Patrick*. A composite cargo vessel, for Peru, the *El Lobito*, was successfully launched last month, and the motor passenger vessel for New Zealand was running trials. Work is proceeding on the two lightships for Trinity House, and on the Canadian Customs cruiser *Margaret*. A considerable number of general engineering jobs have gone through the shops, and the repairs department has been well occupied.

THAMES.

(*From our Own Correspondent.*)

Shipping Companies.—There has always been a friendly rivalry between the P. & O. and British India Company as to which should have the largest fleet. Mostly the latter Company has been in the ascendant, but the P. & O had recently crept up very close by its additions and the acquisition of the Lund Line. Now the British India Company makes a further forward move by acquiring the fleet of five steamers of Messrs. Arch. Currie & Co., of Melbourne, totalling 22,000 tons, which brings its figures up to 575,000 tons, as against 538,000 tons of the P. & O. In point of size, however, the P. & O. is ahead of the other Company. In total tonnage it is represented by 71 steamers as against 127 of the British India. The difference is due to the character of the trades of the two concerns. The Houlder Line has a trading profit for the year 1912 of £93,478; after charges have been met there remains a credit balance of £50,437. With the vessels built and building it is seen a great improvement is made in the Company's position, which will show itself further in the present year.

Cargo Boat Profits.—Sir John Glover, the doyen of London cargo boat owners, has resigned the managing directorship of the Mercantile S.S. Company. A disposable balance of £99,207 enables the Company to propose a dividend of 25%, as against 10% for the previous year. £48,000 is allocated to reserve and the balance sheet shows the high level of the freights market. The question is as to whether such a high level will continue and as to this Sir John Glover will not vouch a prediction. Sir John retains the chairmanship of the Company.

New Oil Motor Vessels.—A company has been registered with a capital of £1,000,000 under the auspices of Sir Marcus Samuel, Bart., and called the Flower Motor Ship Company and contracts have been placed for vessels of 6,000 tons with Swan, Hunter & Wigham Richardson, Ltd., and Sir W. G. Armstrong Whitworth & Co., Ltd. The oil engines are to be of British make. We are, therefore, on the eve of great developments in ship design. At first the vessels will take cargo only, it is understood, and later consider the question of passengers carrying.

Port of London.—The Lord Mayor, who is an ex-officio member, presided at the first meeting of the Local Marine Board for the present year. Among those present were Sir A. Rollit, Capt. Pitman, R.N., Mr. Havelock Wilson and Capt. Owen, secretary. Regret was expressed at the death of Sir Walter Howell, K.C.B., of the Board of Trade. The Lord Mayor afterwards entertained the members to luncheon at the Mansion House.

National Lifeboat Institution.—A meeting of this body has been held at 22, Charing Cross Road, at which were present Earl Waldegrave (chairman), the Earl of Albemarle, Sir Godfrey Baring, M.P., Sir J. C. Lamb (deputy chairman), Sir R. N. Penrose-Fitzgerald, Admiral Sir G. Noel, Rear-Admiral H. B. Stewart and others. Grants were made of the silver medal of the institution to Capt. Burton, R.E. and Robt. Smith, the coxswain of the Tynemouth boat, for gallant services rendered in a severe storm in that district in January.

Sir Frederick Green.—This gentleman has accepted the treasurership of the British and Foreign Sailors' Society, of which the King is patron and Lord Strathcona president. Sir Frederick is the chairman of the Orient Line and is the descendant of the family who were engaged in shipbuilding in Blackwall in 1824.

Southwark Bridge.—A commencement is to be made at once on the rebuilding of this structure, which will cost £300,000. The work will take three and a half years and the new bridge will have 55 ft. widths between parapets and a greatly reduced gradient. There will be five arches, all of steel. Sir W. Arrol & Co. are the contractors. The height of the crown of the bridge will be lowered by 6 ft. 2 ins., thus altering the gradient for traffic.

THE BRISTOL CHANNEL.

(From our own Correspondent.)

Cardiff.

THE stimulating effect of the present great prosperity in the shipping trade is in evidence in every branch of trade around the docks here. All the dry-dock and repairing yards are enjoying their share of the general prosperity, although at the same time many shipowners do not care to have their ships out of the "firing line" while solid freights are the rule of the day. Those shipowners who have always made it a rule to keep their ships in the pink of condition are now reaping the benefit by being able to keep them continuously in service. A very large amount of repair work following on damage sustained by many steamers during the heavy weather so prevalent this winter has given steady employment to large numbers of men in Cardiff, as well as the other principal Bristol Channel ports. The South Wales railways and dock companies' returns for the half-year indicate the prosperous condition of the coal-shipping and kindred trades of the district. The Barry Railway Company, owning Barry Dock, the Taff Vale Railway Company owning Penarth Dock, and the Rhymney Railway Company pay higher dividends than they have done for many years past, and at the same time have placed larger sums to reserve and carry-forward.

An unusual thing has been witnessed here recently in the importation from Germany of coke to supply the iron and steel works. One explanation of the shortage is that during the strike in the early part of last year a large number of coke ovens were badly damaged, and the effect of the shortage has not yet been made good. Some colliery proprietors have scrapped the damaged ovens and are substituting new ones on the most up-to-date principle. Some of these are now nearing completion and will be in operation during the year, so that in the natural course of events the importation of German coke to any appreciable extent will cease.

During the past week dense fog has hampered work at the docks. This rather unusual state of affairs has caused almost a complete standstill in arrivals and departures.

The London Scaling Company opened a branch of their business here a few months ago. This Company's operations cover boiler cleaning and scaling in all its branches on shipboard and ashore, also boiler and steampipe covering with non-conducting compositions. There is apparently a suitable field for their operations in the South Wales district

Engineers' and Shipbuilders' Employers Association.—At the recent banquet held at Cardiff, the event of the evening was the presentation to Mr. Aisbitt of a silver salver, subscribed for by the Bristol Channel dry-dock owners, upon his retirement from the position of Lloyd's surveyor for the Bristol Channel.

A fire occurred on the large refrigerating steamer *El Argentino* during the week, and had assumed quite serious dimensions before it was extinguished by the Docks firemen and the City fire-brigade. It was caused by the upsetting of a naked light in one of the holds.

Newport.

The "Transporter" Bridge.—The "Transporter" bridge at Newport, considered one of the sights of the Bristol Channel was reported to have been run into by a steamer recently, but fortunately escaped without serious injury.

The Steamer "Sola."—Practically all hope has now been abandoned for the safety of the steamer *Sola*, a well-known Bristol Channel trader. She left Newport on Dec. 23rd and was presumably caught in the heavy gale on Christmas Eve. She belonged to the Buenos Ayres Great Southern Railway Company.

Avonmouth.

Avonmouth's Dockmaster.—The vacant post of dockmaster at Avonmouth has now been filled by the selection of Captain William Roberts, commander of the Canadian Northern Railway Company's turbine steamer *Royal Edward*, the selection having been made from over 100 applicants. Captain Roberts was engaged in the North Atlantic trade for many years before becoming the first commander of the *Royal Edward*, when she inaugurated the Royal Line service to Canada. His experience of these boats and of the Bristol Channel will be of great help to him in his new position. The turbine steamer *Royal George* is expected to resume her place in the Royal Line service in April. She is at present in the hands of Messrs. Cammell, Laird & Co., at Birkenhead, undergoing extensive repairs after her recent stranding near Quebec.

Oil Fuel.—The oil trade is becoming one of the leading features of dock business at Avonmouth, and it is understood to be a very remunerative class of trade from the dock authorities' point of view. In connection with the increasing consumption of oil for fuel purposes, a very influential combination has been formed for the supply of fuel oil at different centres. It is understood that there are to be four depots in this country, and there is good reason for believing that one of the depots will be at Avonmouth.

Swansea.

Work is now in full swing in the copper smelting business in this district, which was dislocated by an annoying strike a few months ago.

MERSEY AND MANCHESTER SHIP CANAL.

(From our own Correspondent.)

IT is hoped that more Admiralty orders will shortly come to the Mersey, for the output of which there are now exceptional facilities. An order has been placed for a large Train Ferry for a Canadian Company.

Messrs. Cammell, Laird & Co.—Work in all departments continues to be very brisk, both in repairs and new work. The super-Dreadnought *Audacious* is fast assuming a finished appearance, an immense army of men being employed on board. The destroyer *Garland* is expected to be launched about the middle of March. It has been rumoured that another super-Dreadnought will shortly be built by this firm. The Norwegian liner *Christianiafjord* is nearing completion

in the wet basin, while her sister vessel the *Bergenstjord* is expected to be launched shortly. The first P. & O. liner is partly in frame; work on those two vessels is being expedited as much as possible. The twin-screw steamer *Doon* is fitting out in the wet basin. This vessel was launched on Jan. 22nd for the Royal Mail Steam Packet Company, and is intended for bringing chilled and frozen meat from the upper reaches of the River Plate to the Coast. Her dimensions are: length 220 ft., beam 42 ft. and depth 12 ft. 7 in. Compound engines, with cylinders 15 in. and 33 in. and with 19 in. stroke, running at about 170 revolutions, give the vessel a speed of 9½ knots. Howden's forced draught is fitted, and a very complete installation of refrigerating machinery is supplied by the Liverpool Refrigeration Company. An important order has recently been secured by Messrs. Cammell, Laird & Co. for a combined ice breaker and train ferry for the Transcontinental Railway Company, having a length of 307 ft. and breadth of 65 ft., with twin engine developing 3,200 I.H.P. This vessel will run between Quebec and Point Levis. A train deck will be provided to receive three lines of rails, which will be raised and lowered by means of screw gearing worked by a 3-cyl. H.P. steam engine of between 700 and 800 I.H.P. Eight boilers will be arranged at the sides of the vessel, which will have four funnels. This type of vessel has been advocated as one of the best means of improving the trade facilities of the Port of Liverpool and Birkenhead, and it is a question well worth the consideration of the Chambers of Commerce of the two cities. Mr. Wm. Boyd has recently resigned from the position of shipyard manager to take up an important position with Messrs. Swan, Hunter & Wigham Richardson, at Newcastle-on-Tyne. Mr. J. McGovern, chief ship draughtsman, at Birkenhead, is shortly taking up the duties of chief naval architect to the Prince Line, whose headquarters are at Newcastle. This important post was thrown open to competition by advertisement, Mr. McGovern being finally selected out of a short list of three gentlemen. The repair department have several large contracts in hand, *viz.*, the *Royal George*, for very extensive bottom damage, also the Johnstone liner *Barrowmore*. The latter vessel struck a mine off Salonica and was beached, later having temporary repairs which enabled her to reach Liverpool. The Greek steamer *Salaminia* has had bottom and side damage repair, while the Midland Railway steamer *Londonderry* is having turbine repairs carried out. Several important contracts for boilers have recently been secured by this firm, amongst others a boiler for the S.S. *Junner*, belonging to the Argentine Government Port of Health, a boiler for South of England delivery and other Admiralty sub-contracts.

Messrs. H. & C. Grayson, Ltd.—This busy firm have their usual complement of extensive repair contracts in hand. The American Liner *Merion* is undergoing extensive damage repairs at Birkenhead. The steamer *La Blanca* has sailed after repairs due to collision in the Mersey recently. The auxiliary schooner *Earlshall* is in the Langton Dock having damage recently sustained in the Atlantic made good. The Eastham ferry steamers *Pearl*, *Ruby* and *Sapphire* are going through overhaul ready for the season's work. An important contract has been secured from Trinity House.

The Boats and Davits Committee.—The members of this committee paid a visit to Liverpool on February 7th, when the Dock Boards steamer *Galatea* was placed at their disposal for a cruise on the Mersey, the *Lusitania* being visited. Experiments were carried out in connection with the stability of lifeboats, the location of same in a fog, and the efficacy of rafts, the launching of which was carried out from the White Star tender *Magnetic* in the Canada Dock.

The Mersey Docks and Harbour Board.—At a meeting of this Board on January 30th, a minute of the works committee was adopted appointing Mr. T. Monk Newell to the position of engineer-in-chief to the Board, at a salary of £3,500 per annum. The Board's hopper No. 8 which foundered in the Mersey in the gale on February 7th has now been docked after beaching at Tranmere.

The Port of Chester.—The number of coastwise vessels entering the Port of Chester during the past quarter was 325, with a tonnage of 24,449 tons. Vessels from foreign ports, five, with a tonnage of 6,170, making a total of 330 vessels with a tonnage of 30,619.

The Allan Line.—The *Alsatian* is expected to be launched from Messrs. Beardmore's yard, Dalmuir, about March 8th. This vessel and her sister ship, the *Calgarian*, will have a length of 600 ft. and a beam of 72 ft., with a gross tonnage of 18,500. These vessels will have two funnels, cruiser sterns, Parsons turbines, driving four shafts, will give a speed of 19 knots. The former will be fitted, from the first-class saloons to officers' quarters, in Jacobean style, while the latter will be fitted up in the Georgian. Accommodation for 220 first, 500 second, and 1,000 third class passengers, also for a crew of 470 is provided.

The Cunard and P. & O. Lines.—Arrangements have now been completed whereby the interests of the Cunard Company will be represented by the establishments of the P. & O. in India, China, Japan and in Australia. In the United States and Canada the Cunard will perform similar offices for the P. & O. Company. The launch of the *Aquitania* is expected to take place at Clydebank on April 21st, Lady Derby performing the ceremony.

The Manchester Ship Canal.—The half-yearly report for period ending December 31st shows that a total of 2,898,139 tons was carried, giving an increase in revenue over the corresponding half-year for 1911 of £21,206, with an increase in tonnage of 241,833. This constitutes the most satisfactory half-year since the opening of the Canal.

The Isle of Man Steam Packet Co., Ltd.—The directors report an increase in receipts of £3,677 for the past year. The weather conditions and the price of coal acted unfavourably against the profits. A fast turbine steamer is being built by Messrs. Cammell, Laird & Co. to replace the *King Orry* which has been sold. The purchase of the *Ramsey* and *Peel Castle* was completed during the year. A dividend of 6¾ per cent. was declared.

NORTH-WEST OF ENGLAND.

(*From our Own Correspondent.*)

Barrow-in-Furness.—The congestion of work at the Barrow shipyard of Messrs. Vickers, Ltd., is so great that the firm are not in the position to book any new orders at present, although they have the chance of securing any amount of new orders. They are working zealously on all the orders in hand with the view of getting them delivered so that they can participate in the new business offering in such abundance on every side, but they are handicapped, not only by the general scarcity of men, but by the regulations under which their trade unions will allow them to work. For instance, the Boilermakers' Society will not allow the men engaged in the construction of "Dreadnoughts" or other vessels to work overtime, and the men themselves will not work even a full week, although there is no end of work for them to do. Unless the firm can make arrangements with the unions there will necessarily be delays in the delivery of ships. This matter is engaging the attention of the firm. There is an especial scarcity of shipwrights, not only in Barrow, but throughout the country, and it is now found that this is because of the quiet times lately passed through and the fact that an insufficient number of men have been trained a. this important branch of work. The absence of a sufficiently strong body of men to do the shipwrights' work in vessels in course of erection naturally keeps ships behind, and it is not clear how the masters can amend the situation at present, as men are busily employed all over the country and are not easily induced to leave their present situations to take up new ones, especially so in a town like Barrow where it is known there is a great scarcity of housing accommodation. But while it is recognised that another 1,000 houses for workmen are wanted in Barrow, it is known that schemes have matured whereby 750 houses will be built during the next few months. The building trade in Barrow was never so brisk as it is at present, but speculators are working as hard as they can to overcome this difficulty as quickly as possible.

A New Graving Dock.—A scheme is on foot for the construction of a new large graving dock at Barrow capable of holding the largest vessels yet built or likely to be built in the future. This dock, which it is estimated will cost £300,000 to £400,000, is to be fully 1,000 feet long and capable of taking a vessel drawing up to 30 ft. of water. It is recognised that a dock of this sort is a necessary adjunct to a town so largely interested in shipbuilding, not merely to give facilities for the docking of the big ships built by Messrs. Vickers, Ltd., but with the view of encouraging a big repairing

business in connection with the great monster ships now being built for the navy and commercial tonnage as well. There is plenty of enterprise in connection with those associated with Barrow industries to ensure that this scheme will be carried out shortly, but it is not the only scheme in the air as regards Barrow. It is found to be necessary to make a new entrance to the docks at Barrow to permit of the admission of the big ships now afloat coming into the port. The present entrance to the Ramsden Dock is 100 ft. in width, and it is felt a new entrance should be provided of 120 or 130 ft. width, this work would also involve the cutting of a canal in Barrow Channel some mile and a half in length from the new entrance to deep water at Piel. Thus Barrow may be said to be committed to schemes of improvement which will cost well on to a million pounds.

H.I.J.M.S. Kongo.—This vessel is rapidly approaching completion, and intimations have been given out officially that she must be ready for her trials in May. Much work has yet to be done, but many hundreds of men are employed on the vessel night and day, and there is a rush in every department of work so as to complete the ship in time. The place she occupies at the Buccleuch Dock wharf will be required by the Turkish "Dreadnought" building by the firm which is to be launched in May, and although this vessel is behind-hand it is expected she will be launched about the date specified, as her berth will be needed to put another big ship down later on in the year.

Brazilian Monitors.—The work of building the three Brazilian monitors is proceeding very well, and there is reason to believe the first of the trio will take the water at an early date. Several submarines are also in course of construction, and much activity is shown in this department. Indeed there has never been any slackness in submarine construction since this class of work was first commenced in Barrow, and there is not likely to be any falling off now when the firm are not only busy in building very much larger but also very much improved submarines for the Admiralty, as their use in deep waters a long distance from their base has now been made certain, and they have, therefore, become a much more necessary element in any scheme of war that may arise.

Many labour difficulties have lately arisen at the Barrow works, but they have all been got over amicably, and it is due to the tact of the management that this has been possible, as they see the necessity in these busy times of preventing any dislocation of means of turning out work which reasonable concessions will make possible.

Steel.—The price of shipbuilding material remains very high, and local and other makers are as fully employed as possible, and have orders well in hand.

LAUNCHES AND TRIAL TRIPS.

LAUNCHES—English.

Ariadne Irene.—On Jan. 22nd, this large and finely modelled vessel was successfully launched from the North Sands Shipbuilding Yard of Messrs. Joseph L. Thompson and Sons, Ltd., Sunderland. She has been specially constructed to the order of Messrs. The Ariadne Steamship Company, Limited, of London, and is the second vessel Messrs. Thompson have constructed to the order of this firm. The vessel is 389 ft. long by 52 ft. 6 in. breadth, extreme, by 27 ft. 6 in. depth, moulded, with a bridge extending from mast to mast. The vessel has been constructed to a splendid model, and is designed to have a large deadweight capacity on a very moderate draft of water. The deck machinery and appliances for the rapid handling of cargoes are of an elaborate nature, and when completed the vessel will be a splendid example of a high-class modern cargo carrier. A complete electric lighting installation will be fitted by Messrs. The Sunderland Forge & Engineering Co., Ltd., of Sunderland. The engines and boilers have been constructed by Messrs. Blair & Co., Ltd., of Stockton-on-Tees, the sizes of the cylinders being 25 in., 42 in., 68 in. by 48 in. stroke, supplied with steam by two large boilers working at 180 lbs. pressure. During construction the hull and machinery have been under the personal supervision of Mr. H. M. Rogers, of London, and Mr. H. Dillon Bennett, of Newcastle-on-Tyne.

Tribune and Unyoro.—On January 22nd, there were launched from the yard of Messrs. Cochrane & Sons, Ltd., shipbuilders, Selby, two steel screw trawlers, the principal dimensions being 133 ft. 4 in. by 23 ft. by 13 ft. 11in. moulded. One vessel has been built to the order of Messrs. The Grimsby Union Steam Fishing Co., Ltd., Grimsby, and will be fitted with powerful triple expansion engines by Messrs. C. D. Holmes & Co., Ltd., of Hull. The vessel was christened *Tribune*. The other one has been built to the order of Messrs. The Anchor Steam Fishing Co., Ltd., Grimsby, and will be fitted with powerful triple expansion engines by Messrs. C. D. Holmes & Co., Ltd., of Hull. She was christened *Unyoro*. This is the 36th and 37th vessels built by the firm for the companies under the management of Messrs. Letten Bros.

Somersby.—On January 23rd, Messrs. Ropner & Sons, Limited, Stockton-on-Tees, launched from their shipbuilding yard a steel screw steamer of the following dimensions, *viz.*:—Length, 358 ft. 6 in.; breadth, 50 ft. 10 in.; depth, 25 ft. 8 in. The vessel will be classed 100A1 at Lloyd's, having main deck, poop, bridge and T.G. forecastle. Accommodation for captain, officers and engineers in houses on bridge deck, crew in the forecastle. The vessel has double bottom for water ballast on the cellular principle and in the fore and after peaks. She will be fully equipped with an up-to-date outfit, including quick warping windlass, stockless anchors, steam steering gear amidships, and powerful screw gear aft. The appliances for loading and discharging cargoes expeditiously are very complete, and include nine steam winches, double derricks to each hatch, steam being supplied by a large donkey boiler, working at 100 lbs. pressure per square inch. The engines will be of the triple expansion type, by Messrs. Blair & Co., Ltd., Stockton-on-Tees, of about 1500 i.h.p., having two steel boilers 16 ft. by 10 ft. 6 in., 180 lbs. pressure of steam.

Corton.—On January 23rd, there was launched from the Shipbuilding and Repairing Establishment of Messrs. S. P. Austin & Son, Ltd., Wear Dockyard, Sunderland, the steel steam collier *Corton*, of 5,250 tons deadweight capacity, to the order of Messrs. Wm. Cory & Son, Ltd., of London, and is the twenty-seventh vessel constructed for the same owners. She has been built under Lloyd's special survey for 100 A1 class, with large self-trimming hatchways, and has exceptional water ballast capacity. Accommodation for captain and officers is fitted in the poop, engineers in houses on after end of bridge, and crew in the forecastle. The machinery of large power will be supplied by Messrs. George Clark, Ltd., of Sunderland, and the vessel will be one of the largest specially built for the British coal trade.

Steamer.—On January 23rd, the Northumberland Shipbuilding Co., Ltd., Howdon-on-Tyne, launched the finely moulded steamer which has been built to the order of Messrs. The Antofagasta (Chili) & Bolivia Railway Co., Limited. The vessel is 418 ft. long by 52 ft. 6 in. beam by 30 ft. deep, of the improved 'tween deck type, and has been built under special survey to the highest class at Lloyd's. She is fitted with long bridge, poop and topgallant forecastle. Accommodation in steel houses on bridge deck. There are ten steam winches by Messrs. Clarke, Chapman & Co., Ltd. A large number of cargo derricks and steam windlass by Messrs. Emerson, Walker and Thompson Bros. The usual water ballast arrangements, including fore and aft peak tanks for light passages, are fitted. The machinery will be fitted by Messrs. The North Eastern Marine Engineering Co., Ltd., of Wallsend, consisting of engines with cylinders 27 in., 44 in., 73 in. by 51 in. stroke, three large boilers with 180 lbs. pressure. The vessel will carry about 8,100 tons on a light draft and steam about 11 knots loaded at sea. During construction the vessel has been superintended by Messrs. John Crookston & Son, London.

Pearl.—On January 25th, there was launched from the yard of Messrs. Cochrane & Sons, Ltd., shipbuilders, Selby, a steel screw trawler, the principal dimensions being 133 ft. 4 in. by 23 ft. by 13 ft. moulded. The

vessel will be replete with all the latest improvements for the fishing trade, and will be fitted with powerful triple expansion engines by Messrs. C. D. Holmes & Co., Ltd., of Hull. As the vessel left the ways she was christened *Pearl*.

Citano.—On January 28th, a handsomely modelled steamer, the *Citano*, built to the order of Messrs. Thomas Wilson, Sons & Co., Ltd., for their general Stockholm trade was launched from the yard of Earle's Shipbuilding and Engineering Company, Limited, Hull. The principal dimensions are: Length, 250 ft.; breadth, 37 ft. moulded; depth, 16 ft. 6 in. moulded. She has been constructed of steel throughout to the British Corporation Registry's highest class, and to the latest requirements of the Board of Trade. The vessel is of the shelter deck type with cruiser stern and designed for carrying a large quantity of water ballast. The accommodation consists of chart room and captain's room in a house on the bridge deck, the officers, engineers and steward being berthed in houses round the engine and boiler casing, and the petty officers and crew aft. She has two steel masts and efficient appliances for the rapid handling of cargo, the derricks being worked by powerful steam winches of up-to-date description. A steam windlass, also steam and hand-steering gear, will be fitted. A capacious refrigerated chamber is arranged at fore end of the after hold for carrying beef, butter, etc. The vessel will be fitted up with a complete electric light installation. The saloon, officers' and engineers' rooms will be heated by steam. The machinery consists of a set of triple expansion engines having cylinders 19 in., 31 in. and 53 in. diameter by 36 in. stroke, steam being supplied by two single-ended cylindrical boilers working at a pressure of 180 lbs. per square inch.

Malmberget.—On Jan. 6th, Messrs. R. & W. Hawthorn, Leslie & Co., Ltd., launched from their yard at Hebburn a special type of ore-carrying steamer, 458 ft. long, and having a deadweight capacity of 11,500 tons. She is the fourth vessel of this type constructed by these builders to the order of Messrs. Rederiaktiebolaget Lulea-Ofoten, of Stockholm. As the vessel left the ways she was named *Malmberget*. The vessel is constructed with four double and four single ore pockets or holds on the self-discharging principle. Between these pockets or holds discharging compartments are arranged, extending from the deck to the bottom of the ship, containing the chutes, which deliver the ore by gravity into iron skips, thus affording economical loading and discharging. Eight hydraulic cranes are fitted on the deck to manipulate the skips, each being capable of dealing with a load of four tons. The holds and living spaces will be heated by a patent system of specially large capacity under the hoppers, to prevent the ore from freezing in the pockets in the cold regions in which the vessel will trade. The vessel will be fitted with water ballast tanks having a total capacity of about 3,640 tons. The crew will be berthed in the forecastle; the captain, officers, engineers and stewards aft. Amidships there will be accommodation for the captain's office, wireless operator, hospital, store rooms, and chart room. The vessel is being built to the British Corporation's highest class and in compliance with the Swedish law. The triple expansion engines, having cylinders 27 in., 45 in. and 74 in. by 54 in. stroke, with three powerful boilers, are being constructed by Messrs. R. & W. Hawthorn, Leslie & Co., Ltd., at their St. Peter's works.

Ellin.—On February 6th, the s.s. *Ellin* (meaning "Greek") was successfully launched from the shipyard of Messrs. Short Bros., Ltd., at Pallion, Sunderland. She has been built on the Isherwood patent system to the order of S. G. Embiricos, Esq., of Athens and Cardiff, her dimensions being: Length, 405 ft.; beam, 52 ft.; and depth moulded, 26 ft. 3½in., and she is designed to carry a deadweight of 7,800 tons on a light draft. The vessel, which will take Lloyd's highest class, is of the single deck type with shelter deck 8 ft. high, all fore and aft. An extra large quantity of water ballast is provided in the double bottom with very large fore and aft peak tanks. Every arrangement that would conduce to economy has been considered in designing the steamer, very large hatches being trunked through the shelter deck to reduce the cost of loading, and the winches specially constructed with extended whipping shafts and large barrels and drums in conjunction with double derricks stepped on tables at each mast with outriggers above that discharging may be rapidly and easily carried out. The saloon, neatly panelled in oak, is situated in a large deckhouse on shelter deck together with rooms for owner, steward, spare rooms, bathroom, etc. House above saloon is arranged for captain and chartroom, with a teak octagonal wheelhouse above. The officers' and engineers' rooms are in deckhouses alongside of engine casing, and the crew are berthed in the after end of shelter deck. A large donkey boiler of multitubular type is fitted on the main deck, capable of maintaining a full head of steam when all auxiliary machinery is working. The propelling machinery will be fitted by Messrs. John Dickinson & Sons, Ltd., of Sunderland, and consists of engines with cylinders 25½, 42 and 71 in. diameter, and 48 in. stroke, taking from two powerful boilers working at 180 lbs. pressure. During construction the vessel and machinery have been under the personal supervision of Mr. Henry J. Richards, of Cardiff, who also represented the owners at the launch.

Queensland Transport.—On February 6th, Messrs. Irvine's Shipbuilding & Dry Docks, Co., Ltd., launched from their Harbour Dockyard, West Hartlepool, the steel screw steamer *Queensland Transport*, built to the order of Messrs. Furness Withy & Co., Ltd., for Messrs. The Empire Transport Co., Ltd. (Messrs. Houlder Bros. & Co., Limited, managers), London. The dimensions of the vessel are: 400 ft. in length by 52 ft. beam extreme, by 29 ft. 6 in. depth moulded, carrying over 8,000 tons on a moderate draft. She is built to British Corporation classification, having a single deck of steel, with poop, bridge and forecastle, and water ballast is carried in cellular double bottom and fore and after peak tanks. The vessel is constructed with deep frames and longitudinal stringers, and is divided into seven watertight compartments by means of six bulkheads. Wood grain divisions are fitted throughout the holds according to the latest Board of Trade regulations. Four large hatches are provided, and a cross bunker hatch, together with all the latest facilities for the rapid loading and discharging of cargo, including 10 steam winches exhausting back into the stokehold, and 12 derricks. A powerful quick-warping steam windlass is fitted forward, with steam steering gear amidships and hand gear aft. The captain, officers and engineers are berthed in large houses amidships, and the crew and firemen in the forecastle. The lighting, heating and sanitary arrangements have received special attention, the most improved methods being adopted throughout. Triple expansion engines will be supplied and fitted by Messrs. Richardsons, Westgarth & Co., Ltd., Hartlepool, having cylinders 25 in., 40 in. and 68 in. by 48 in. stroke, with three large boilers, working at a pressure of 180 lbs. per square inch. It is interesting to note that this vessel is larger and heavier than anything previously built at the same yard.

Clarissa Radcliffe.—On February 6th, Messrs. Craig, Taylor & Co., Ltd., launched from their Thornaby Shipbuilding Yard, Thornaby-on-Tees, a very fine screw steamer of the following dimensions: 430 ft. by 55 ft. 6 in. by 36 ft. 7½ in. moulded to bridge deck. She is built of steel on the single deck type, with poop, long bridge, and topgallant forecastle, to Lloyd's highest class, but has in addition to same, increased scantlings to the owners' special requirements. She has large water ballast capacity in double bottom fore and aft, and in peaks, and is equipped with patent direct steam windlass with quick warping ends, steam steering gear, large multitubular donkey boiler, six special steam winches, double derricks, stockless anchors, very large hatches, and all the latest improvements for rapid loading and discharging. The masts and funnel have been arranged to suit Manchester Ship Canal requirements; shifting boards are fitted throughout for the carriage of grain cargoes, and all has been arranged to a complete and full specification. The accommodation for captain, spare rooms, and officers is neatly fitted up in deckhouses amidships on bridge, the engineers being in deckhouses alongside engine casing, and the crew in the poop, with special messrooms, bath-

rooms, etc. The whole accommodation has been arranged on a very ample scale, giving each compartment extra large cubic and floor space. Her engines have been constructed by Messrs. Blair & Co., Ltd., Stockton, the cylinders being 28 in., 46 in., 75 in. by 48 in. stroke, with three large boilers working at 180 lbs. pressure. The vessel has been built to the order of Messrs. Evan Thomas Radcliffe & Co., Cardiff, under the superintendence of Captain Hesketh, Mr. H. E. Paradise, Mr. Maxwell Hill, and Mr. W. T. James. The vessel is a duplicate of three similar steamers already built by Messrs. Craig, Taylor and Co., Ltd., for the same owners.

St. Chamond.—On February 7th, Messrs. William Gray and Co., Ltd., launched the handsome steel screw steamer *St. Chamond,* which they have built for Messrs. Les Chargeurs de L'Ouest Société Anonyme de Navigation, Nantes. She will take the highest class in the Bureau Veritas Register, and is of the following dimensions, *viz.* :—Length overall, 325 ft. 6 in.; breadth, 45 ft. 6 in.; and depth, 23 ft. 5½ in.; with long bridge, poop and topgallant forecastle. The saloon, staterooms, captain's, officers', and engineers' rooms, etc., will be fitted up in houses on the bridge deck, and the crew's berths in the poop. The hull is built with deep frames, cellular double bottom and large after peak ballast tank, self trimming hatches, five steam winches, steam steering gear amidships, hand screw gear aft, patent direct steam windlass, large horizontal multitubular donkey boiler, stockless anchors, telescopic masts with fore and aft rig, and all requirements for a first-class cargo steamer. Triple expansion engines are being supplied by the Central Marine Engine Works of the builders, having cylinders 23 in., 36½ in., and 62 in. diameter, with a piston stroke of 42 in., and two large steel boilers for a working pressure of 180 lbs. per square inch. The ship and machinery have been built under the superintendence of Mr. A. Martail on behalf of the owners.

Shahristan.—On February 10th, Messrs. William Gray and Company, Ltd., launched the handsome steel screw steamer *Shahristan,* which they built for Messrs. Frank C. Strick & Co., Ltd., of Swansea and London. The vessel will take the highest class in Lloyd's register, and is of the following dimensions, *viz.* :—Length overall, 392 ft.; breadth, 51 ft. 6in.; and depth, 30 ft. She is a handsomely modelled vessel with two decks laid and poop, long bridge and topgallant forecastle, and having very tasteful cabin accommodation in houses on the bridge deck for passengers, captain and officers, and the crew is berthed in the forecastle. An electric light installation is fitted throughout. A cellular double bottom and after peak tank and in addition a deep tank or hold compartment are fitted for water ballast abaft the engine room, giving a total capacity for water ballast of about 2,000 tons. The whole of the outfit, including sanitary tanks, fresh water distiller, steam windlass, steam steering gear, two derricks to lift 30 tons each, twelve steam winches with return exhaust to winch condenser, of the contraflo type, are of the most approved description. The machinery is made by the Central Marine Engine Works of the builders, being of the triple expansion type, with cylinders 28 in., 46 in. and 77 in. diameter, with a piston stroke of 48 in. She is fitted with a complete outfit of auxiliaries, including duplex ballast pumps, evaporator, etc., all of the "Cmew" special type, contraflo main condenser, Weir's feed pumps and heater and three large steel boilers working by Howden's system of forced draft at a pressure of 180 lbs. per square inch. The ship and machinery have been built under the superintendence of Mr. Archibald Walker on behalf of the owners.

Doon.—Messrs. Cammell, Laird & Co., Ltd., have launched from their Birkenhead yard the steamship *Doon,* the second of two vessels for the Royal Mail Steam Packet Company, designed for the conveying of chilled and frozen meat from the upper reaches of the River Plate to their ocean-going steamers, engaged in the chilled meat trades with British ports. The vessel is 220 ft. long, with a beam of 12 ft. 7 in., and her speed will be 9½ knots. She is built of steel, with continuous main deck and long upper deck, with double bottom under holds.

LAUNCHES—Scotch.

Screw Steamer.—On January 25th, The Ardrossan Shipbuilding Company launched a steel screw steamer which they have built to the order of Messrs. John Birch and Co., London, for Indian owners. The vessel, which is the largest yet launched at Ardrossan, is intended for the coasting trade, and is 210 ft. in length, 30 ft. in breadth, and 11 ft. 9 in. in depth. Engines will be supplied by Messrs. Miller & M'Fie, Glasgow.

Steel Screw Steamer.—Messrs. Russell & Co., Port Glasgow, launched recently a steel screw steamer of 5,800 tons gross, which they have built for Messrs. Charles Barrie & Son, Dundee. The vessel, which is a first-class cargo steamer, has been constructed to the highest class at Lloyd's, and is of the following dimensions :—Length, 423 ft. 6 in.; beam (moulded), 56 ft.; and depth 31 ft. 4 in. During the construction the vessel was superintended by Captain Peter Singer for the hull, and by Mr. A. Lang, assisted by Mr. Sandeman, for the machinery. Messrs. Rankin & Blackmore, Greenock, will supply the engines.

Ugiebank.—Messrs. Hall, Russell & Co., Aberdeen, launched recently a steam trawler for the Peterhead Trawling Company. The vessel, which was named *Ugiebank,* is 177 ft. in length, 22 ft. in breadth, and 13 ft. in depth. Triple expansion engines will be supplied by the builders.

Hardinge.—Messrs. A. & J. Inglis, Pointhouse, launched recently the turbine steamer *Hardinge,* the second of three sister ships which they are building for the South Indian Railway Company. These steamers have been designed to conduct a ferry service which their owners are about to establish between Dhaneshkodi, in the island of Rameswaram, on the Indian side, and Talemanaar, in the Island of Manaar, on the Ceylon side. At each of these places piers are to be constructed for the accommodation of trains, and passengers and goods will be transferred direct between the trains and the steamers. The steamers have a length over all of about 260 ft., a breadth of 38 ft., and a depth to promenade decks of nearly 19 ft. They will be rather less than 700 tons gross. They have been built of steel throughout, and are classed at Lloyd's for special service. The propelling machinery, which is constructed by the builders, will consist of two sets of geared turbines of the latest Parsons type, one high pressure and one low pressure, being coupled to each of the two shafts by means of machine-cut gears, and each shaft driving one of the twin screws. The revolutions of the turbines will be about 3,500 per minute, which will give a high turbine efficiency. By means of the mechanical reducing gear the propellers will revolve at a much less speed—500 revolutions—and so secure greater propulsive efficiency. The boilers are of the Yarrow type, and have been constructed by Messrs. Yarrow to the order of the contractors for the vessels.

Berta.—Messrs. John Cran & Co., Leith, have launched the steel screw tug *Berta*—the first of two which they are building for the Antofagasta and Bolivia Railway Company, for service at Antofagasta. The vessel, which is 62 ft. in length, 15 ft. in breadth (moulded), and 8 ft. in depth (moulded), will be fitted by the builders with powerful engines.

Colusa.—On February 7th, there was launched from the shipbuilding yard of Messrs. William Hamilton and Company, Ltd., Port Glasgow, the steel screw steamer *Colusa,* which they have built to the order of Messrs. W. R. Grace & Co., of New York and London, for their San Francisco and South American passenger and general cargo trade. The principal dimensions, etc., are as follows :—Length, 424 ft.; breadth, 58 ft.; depth to upper deck, 29 ft. 2 in.; deadweight carrying capacity, 8,000 tons. The vessel which is built to Lloyd's highest class on the Isherwood system of longitudinal framing, embodies all the latest improvements which the builders' large experience of the type can suggest, and has a poop, topgallant forecastle, long bridge with promenade deck above

same, and navigating deck. Commodious accommodation is provided on the bridge deck for first-class passengers, doctor, purser, stewards, stewardesses, etc., with pantries, service rooms, bathrooms, lavatories, etc., all fitted up in superior style. The dining saloon is placed immediately before the passenger accommodation, and is arranged with small tables and chairs in restaurant fashion. At sides of saloon are four special cabins with bathrooms, etc., "en suite." On the promenade deck, in a large house at forward end, is placed the drawing room, and captain's accommodation with bathroom, lavatory, etc. At the after end of this deck is another deckhouse containing the first-class smoke-room and bar. On the navigating deck accommodation is provided for Marconi room, chartroom, wheel house and shelter. The officers are berthed abaft passengers' rooms, while the engineers are accommodated on and in the bridge, convenient to engine casing. The principal galley, scullieries, bakery, cooks' rooms, offices, etc., are arranged on the bridge deck; while the seamen, firemen and petty officers are berthed in the poop. Under the bridge deck is fitted a large refrigerating chamber, divided into four rooms for the storage of provisions, etc., for passengers and crew. A strong bullion room is fitted under the forecastle deck. The vessel is fitted up with a complete installation of electric light, installed by the builders' own staff, and is equipped for wireless telegraphy on the Marconi system. Water ballast is provided in cellular double bottom deep tank and peaks. The arrangements for handling cargo are very complete, and include ten powerful steam winches, four masts, 18 derricks of steel tube and one heavy steel derrick suitable for dealing with 20 ton lifts. A steam steering gear on the Wilson & Pirrie principle is arranged in a house aft, with telemotor control from navigating bridge. In addition to the life saving appliances, which are in accordance with the latest Board of Trade requirements, the vessel is provided with a motor launch. The machinery is being supplied by Messrs. D. Rowan & Co., of Glasgow, and consists of quadruple expansion engines on the Yarrow, Schlï & Tweedy principle, and three large multitubular boilers fitted with Howden's forced draught, capable of propelling the vessel at a speed of 12 knots in service. The *Colusa* has been constructed under the superintendence of Mr. R. J. Quelch (the company's consulting naval architect and engineer), and Captain Minister, who takes command of the vessel.

Chakrata.—On February 10th, there was launched from the shipbuilding yard of Messrs. David & William Henderson & Co., Ltd., at Partick, Glasgow, the large steel screw steamer *Chakrata,* of about 5,800 tons gross, which they have built for Messrs. The British India Steam Navigation Co., London, for their Eastern trade. This addition to the already large fleet of vessels owned by The British India Co., is 420 ft. long between perpendiculars, by 54 ft. 6 in. broad by 31 ft. 3 in. depth moulded, is classed in Lloyd's 100 A1, and fulfils the requirements of the Board of Trade for their passenger certificate. She is rigged as a two-masted schooner, and has an exceptionally large number of powerful derricks, which, with 12 steam winches, provide ample means for the rapid handling of large cargoes. Comfortable accommodation is provided amidships for a limited number of passengers and for officers, engineers, etc., while the crew are berthed forward in forecastle. The machinery, which has been constructed by the builders, consists of triple expansion engines, having cylinders 28 in., 46 in. and 77 in. diameter by 48 in. stroke, with steam from four single-ended boilers working at 180 lbs. pressure.

LAUNCHES—Irish.

Summerfield.—The Dublin Dockyard Company have launched the steamer *Summerfield* for the Zillah Shipping and Carrying Company, Liverpool. The vessel, which is 196 feet in length, will be supplied with triple expansion engines by Messrs. Ross & Duncan, Glasgow. The hull and machinery were constructed under the supervision of Mr. P. Wallace, Glasgow.

Patia.—On January 28th, at high water, Messrs. Workman, Clark & Co., Ltd., Belfast, launched from their South Yard the twin screw steamer *Patia,* built by them for Messrs. Elders & Fyffes, Ltd., London, for general fruit carrying and passenger service between British and West Indian and Central American ports. The *Patia* is 432 feet in length, with a gross tonnage of about 6,000 tons, and has been built in accordance with the requirements of the British Corporation Registry of Shipping and the British Board of Trade. Accommodation for first-class passengers is provided in staterooms arranged for one or two persons. These rooms are commodious apartments comfortably and tastefully furnished, and a number of them are so arranged with communicating doors and adjoining lavatories, as to be available for family suites when so required. The public rooms include a spacious dining saloon with tables arranged to suit small or large parties dining together; a luxurious music room; also a comfortable smoke room with bar adjoining. The main feature of all the rooms, public and private alike, is the admirable combination of comfort and artistic taste of the furnishings and decorations. The cargo space of the vessel is divided into six compartments specially insulated and otherwise prepared for the carriage of fruit in bulk. For the preservation of this cargo and the stewards' perishable stores an extensive plant of refrigerating machinery has been installed, the cooled fresh air being delivered by electrically driven fans through ducts to each compartment. The vessel will be propelled by two independent sets of triple expansion engines of approved design, with a complete installation of auxiliary plant, supplied with steam from two double-ended and two single-ended steel cylindrical multitubular boilers working under an approved system of forced draught.

TRIAL TRIPS.

Socoa.—On January 24th, the first-class finely modelled cargo steamer *Socoa,* for Messrs. Plisson & Co. (Compagnie des Chargeurs Francais), of Paris, proceeded to sea on her trial trip, half loaded. Her principal dimensions are:—Length, 299 ft.; breadth, 46 ft.; depth moulded, 24 ft. 10 in. She has taken Lloyd's highest class, and is constructed on the deep frame principle with one deck, leaving the holds clear of all obstructions. Ample water ballast is provided in the cellular bottom and after peak tank, and provision is made for carrying oil fuel in three compartments of the double bottom. The erections consist of poop 29 ft., bridge 90 ft., both available for cargo, and forecastle for the accommodation of the petty officers and crew. Large and spacious deck houses are arranged on top of the bridge deck for captain, officers, and engineers, the saloon being tastefully decorated in polished oak. There are four large hatchways, each worked by a powerful steam winch for the rapid loading and discharging of cargo, with multitubular boiler of ample capacity for supplying steam to deck machinery, steam windlass and steam steering gear. The engines, by Messrs. The North Eastern Marine Engineering Co., Ltd., Sunderland, have cylinders 22½ in., 37½ in. and 61 in., with a stroke of 42 in., steam being supplied by large boilers working at a pressure of 180 lbs. per square inch. Notwithstanding the extremely unfavourable weather conditions, there being a strong sea running, the trial was very successful, the engines working with perfect smoothness, a mean speed of about 10½ knots being attained, and Mr. Duncan Buchanan, the owners' superintendent, expressed himself highly satisfied with vessel and machinery. After the trial the vessel proceeded to Havre, where she will run the official French Government trials.

Aeon.—On January 24th, the fine steel screw cargo steamer *Aeon,* built by Sir Raylton Dixon & Co., Ltd., at their Cleveland Dockyard, Middlesbrough, to the order of Messrs. Howard Smith Co., Ltd., of Melbourne, Australia, for their extensive business in the Antipodes, proceeded to sea for her official trials. The trials passed off most successfully, and the vessel sailed for Australia under the command of Captain A. Y. Catto. For Launch, see December issue.

Murjek.—On January 25th, this large vessel, which has recently been completed by Messrs. Joseph L. Thompson

and Sons, Ltd., of the North Sands Shipbuilding Yard, Sunderland, for Messrs. Rederiaktiebolaget Lulea Ofoten, of Stockholm, of which company Mr. P. A. Welin is managing director, proceeded to sea for her official trial trip, when a mean speed of eleven knots was easily maintained, everything working smoothly and giving complete satisfaction to the owners. The vessel has been specially strengthened and arranged for the iron-ore trade from Narvik, the tank top having a double protection of ceiling, the ceiling being continued up the ship's side. The vessel is fitted with a Wilson-Pirrie's telemotor steering gear fitted in the poop, controlled from amidships. A Marconi's wireless installation has been fitted, and a complete installation of electric lighting, with electric bells, by the Sunderland Forge and Engineering Co., Ltd., of Sunderland. Extra large lifeboats have been fitted, these being raised and lowered by means of Welin's patent quadrant davits. The crew and firemen are berthed in a large topgallant forecastle, with separate messrooms for the sailors and firemen, two washhouses, and steam heated throughout. The amidship accommodation on the bridge for the captain, officers and engineers, is of a specially elaborate character, steam heated throughout, and no expense has been spared to ensure the comfort of the officers and crew. Eight steam winches and nine derricks are fitted to ensure the rapid handling of cargoes. The engines and boilers have been constructed by Messrs. John Dickinson & Sons, Ltd., of Sunderland. During construction the vessel and machinery have been under the personal supervision of Mr. W. Lundbohm, the owners' superintendent, and Captain A. Fris, who has taken command of the vessel, which after the trial trip proceeded to her loading port.

Cyrena.—On January 27th, the handsome steel screw steamer, *Cyrena,* built by Messrs. Wm. Gray & Co., Ltd., for Messrs. The Anglo-Saxon Petroleum Co., Ltd., London, had her trial trip. The trial was a very satisfactory one, the engines running smoothly and well, and the ship doing an average speed of 12.2 knots. Amongst those who witnessed the trial were Mr. C. Zulver, marine superintendent, Captain Dalmeyer, marine superintendent, Singapore, Captain Scott, nautical adviser to the firm, Mr. J. C. Stephens, superintendent engineer, Mr. A. J. Taphouse, assistant superintendent, and Captain Jones, in command. For Launch, see January issue.

Salmonpool.—On January 29th, the s.s. *Salmonpool,* built by Messrs. Ropner & Sons, Ltd., of Stockton-on-Tees, made her official trial trip in the Tees Bay. The vessel has been built under the superintendence of Mr. J. Nicholson, and on her trial behaved in a thoroughly satisfactory manner. The owners were represented by Mr. J. Nicholson, and the builders by Mr. J. R. Garthwaite. After some very satisfactory trial runs, during which the vessel attained a speed of over 12 knots, she proceeded to Dunston to load. For Launch, see January issue.

Kalix.—On February 1st, the fine steel screw steamer *Kalix,* built by Sir Raylton Dixon & Co., Ltd., at their Cleveland Dockyard, Middlesbrough, to the order of the Rederiaktiebolaget Lulea Ofoten, of Stockholm, Sweden, of which company Mr. P. A. Welin is managing director, proceeded to sea for her official trials. The trials passed off most successfully, and the vessel proceeded, under the command of Captain Robert P. Bruce, to Burntisland, for cargo of coal, whence she will sail for Narvik to load iron-ore. The steamer has been constructed under the superintendence of Mr. Wilh. Lundbohm and Captain Bruce. For Launch, see January issue.

Strinda.—On February 6th, the s.s. *Strinda,* built and engined by Messrs. William Doxford & Sons, Ltd., Pallion, Sunderland, to the order of J. Ludwig Mowinckel, Esq., of Bergen, ran a successful trial, when a mean speed of 11½ knots was obtained. The dimensions of the vessel are:—Length, 455 ft.; breadth, 57 ft. moulded; depth, 36 ft.; deadweight capacity, 11,000 tons. Particular attention has been given to the accommodation of the officers and crew. Classification is with the Norwegian Veritas. There were present at the trial for the owner Mr. J. Houston and Captain O. Olsen.

Joachim Brinch Lund.—On February 8th, Messrs. Osbourne, Graham & Co., sent to sea for her official trial the steel screw steamer *Joachim Brinch Lund,* which they have specially constructed to the order of Messrs. J. Lund and Co., of Bergen. Engines and boilers were supplied by Messrs. George Clark, Ltd., of Sunderland, and the trial resulted in the vessel obtaining a mean speed of 10½ knots on a moderate consumption. This was very satisfactory to all concerned. For Launch, see February issue.

Danubius.—Trials have recently been run of the Shields-built tug *Danubius,* which has been constructed for towage services on the Danube. The vessel, which is 100 ft. long, has been built under the special survey of Lloyd's Register. The propelling machinery, of 400 i.h.p., consists of one set of triple compound surface condensing engines having cylinders 11½, 20, and 32 in. diameter by 22 in. stroke. The trial trip throughout was of a satisfactory character, the speed over the measured distance at Whitley approximating 12 knots per hour.

City of Marseilles.—The large twin-screw passenger steamer *City of Marseilles,* built to the order of the Ellerman Lines, Ltd., by Palmers Shipbuilding and Iron Company, Ltd., Jarrow, has been taken to sea for trial trip. The vessel was taken for several runs over the measured mile, the mean speed attained being over 13 knots, the machinery working throughout very smoothly. A full programme of steering, anchor, and other trials was subsequently carried out in a very satisfactory manner. For Launch, see December issue.

Tabarka.—On February 12th, the handsome steel screw steamer *Tabarka* was taken from the yard of Messrs. Wm. Gray & Co., Ltd., for her trial trip. She has been built to the order of Messrs. Frank C. Strick & Co., Ltd., of London and Swansea, for La Tunisienne Steam Navigation Co., of Paris. The trial was satisfactory to all concerned, an average speed of 11½ knots being maintained on the run round to the Tyne. The owners were represented by Mr. Archibald Walker, who has also superintended the construction of ship and machinery; Mr. James Innes represented Lloyd's Registry. For Launch, see January issue.

Willochra.—The latest addition to the Australian mercantile fleet, the 8,000-ton twin-screw steamer *Willochra,* built by Messrs. William Beardmore & Co., Dalmuir, for the Adelaide Steamship Company, has completed her official trials on the Firth of Clyde with marked success, having attained a mean speed of over 16 knots loaded. For Launch, see September issue.

Trevethoe.—On Feb. 15th, the new screw steamer *Trevethoe,* built by Messrs. John Readhead & Sons, Ltd., West Docks, South Shields, to the order of Messrs. Edward Hain and Son, St. Ives, Cornwall, was taken to sea on her official trial trip. The trial was in every way satisfactory to all concerned, and the vessel will load for Port Said under the command of Captain Michell. This is the sixtieth vessel built for the above firm by Messrs. John Readhead & Sons, Ltd. For Launch, see February issue.

Roumanian Prince.—On Feb. 17th, this vessel, which was launched on the 7th January, was taken for trial at sea, when she more than attained her contract speed. She has been built to the order of the Prince Line, Limited, of Newcastle-on-Tyne. For Launch, see February issue.

BOARD OF TRADE EXAMINATIONS.

JANUARY 30th, 1913.—LONDON.—*Ex. 1st Class:* C. Young. *1st Class:* S. Boyes, T. Smartt. *2nd Class:* E. Beacall, G. Caiger, J. Graham.

SUNDERLAND.—*1st Class:* F. Hope. *2nd Class:* J. Ayre, W. Dickson, C. Moore, A. Scott, P. Walton, W. Wilson.

NORTH SHIELDS.—*Ex. 1st Class:* F. Cardno, L. Miller. *1st Class:* G. Chambers, W. Dockwrey, R. Goodfellow. *2nd Class:* C. Deakin, J. Hunter, J. Sword, J. Wanless, A. Wilson.

BRISTOL.—*1st Class:* J. Wilcox. *2nd Class:* W. Dykes, J. Jones, G. Lomax, A. Richards.

LIVERPOOL.—*Ex. 1st Class:* S. Kelly. *1st Class:* R. Dunning, H. Morris, J. Tulloch. *2nd Class:* A. Bowden, W. Crompton, W. Finlay, B. MacKinnon, J. Montgomery, D. Owler, N. Tay.

HULL.—*1st Class:* W. Smaje. *2nd Class:* R. Brown, J. Taylor, A. Wilson.

ABERDEEN.—*1st Class:* C. Gordon, J. Simpson, W. Fawse. *2nd Class:* R. Bannerman, W. Robertson, J. Summers.

GREENOCK.—*1st Class:* R. Fairfoul, J. Hutcheson. *2nd Class:* D. Campbell.

LONDONDERRY.—*1st Class:* R. Wright. *2nd Class:* W. Boyles.

FEBRUARY 6th, 1913.—LONDON.—*1st Class:* A. Fallwell, E. Hudspeth, W. Perkins, G. Turner. *2nd Class:* T. Barry, W. Gilfillan.

GLASGOW.—*1st Class:* J. Benson, J. Blain, R. McConnell, J. Murray, W. Small, W. Whitton. *2nd Class:* R. Imrie, J. Livingstone, F. McNie, E. Mattock, T. Porter, R. Spiers.

DOVER.—*2nd Class:* S. Newport.

BELFAST.—*1st Class:* E. Bayley, D. MacKellar, I. McKinley, D. Wilson. *2nd Class:* J. Coid.

CARDIFF.—*1st Class:* C. Fay, L. Isitt, J. Russell. *2nd Class:* R. Constantine, A. Longwill, H. Phillips.

LIVERPOOL.—*1st Class:* R. Jones, J. Murphy, R. Reid, R. Tapley, C. Wyatt. *2nd Class:* C. Berry, R. Cowper, J. Edgar, R. Morrish, G. Potter, A. Sibbald.

NORTH SHIELDS.—*1st Class:* G. Cowie, V. James, J. Oxberry, J. Thompson. *2nd Class:* A. Berwick, P. Carr, C. Downie, G. Johnson, E. Kennedy, G. Mackrow, J. Ray, T. White.

SOUTHAMPTON.—*1st Class:* C. Fisher, P. Kindred, F. Toneri. *2nd Class:* T. Boulton.

LEITH. *1st Class:* J. Ross, J. Sharp. *2nd Class:* W. Hutchinson, W. Rodgers.

FEBRUARY 13th, 1913.—LONDON.—*1st Class:* J. Hamilton, W. Lambert, S. Williamson, G. Wood. *2nd Class:* C. Bigg-Wither, G. Brown, W. Burton, A. Cooke, A. Marsden, W. Richards, N. Walker.

GREENOCK.—*1st Class:* J. Cameron, P. McIntyre. *2nd Class:* S. Allison, C. Anderson, J. Arnott, J. Brown, D. Hassett, G. Robb, G. Tait.

LIVERPOOL.—*1st Class:* G. Hall, T. Kelly. *2nd Class.* W. Buckley, E. Carroll, E. Charters, R. Quinlan, W. Rutherford.

NORTH SHIELDS.—*1st Class:* C. Petrie. *2nd Class:* J. Ayres, J. Erskine, R. Gateshill, W. Hodge, T. Kriham, W. Millican, W. Olliff, G. Robinson, G. Storey, C. Wilson.

DUNDEE.—*2nd Class:* A. Green.

FEBRUARY 20th, 1913. LONDON.—*2nd Class:* J. Jones, H. Munro, H. Webb.

GLASGOW.—*1st Class:* R. Hibbs, D. Hoseason, D. O'Hara, D. Wilson. *2nd Class:* T. Drever, J. Govan, E. Harrower, T. Hubbard, J. Lochhead, J. Macrone, J. Sibbald, J. Wilson.

WEST HARTLEPOOL.—*1st Class:* H. Squires, R. Williams, *2nd Class:* W. Burrows, G. Calvert, W. Greenlees, F. Pinder, H. Wallace, V. Wilson.

LEITH.—*1st Class:* H. Wilson.

LIVERPOOL.—*1st Class:* J. Cuthell, J. Harries, R. Williams. *2nd Class:* H. Box, J. Doyle, A. Jones, F. Jordan, C. McKelvey, S. Mervin, J. Rosser, J. Todd.

NORTH SHIELDS.—*1st Class:* A. Harbottle, W. Skinner, T. Walker. *2nd Class:* T. Blenkinsop, J. Hogg, J. McGregor, C. Mace, J. Prior, G. Shields.

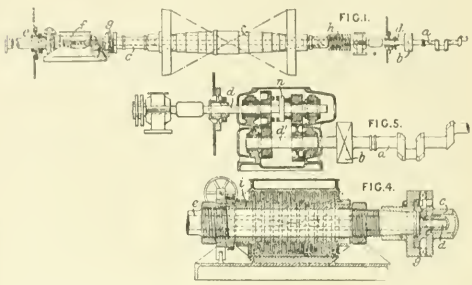
PLYMOUTH.—*1st Class:* A. Crocker.

CARDIFF.—*2nd Class:* E. Davies, W. Davies, J. Knowles, H. Newman.

Abridgments of New Patents.

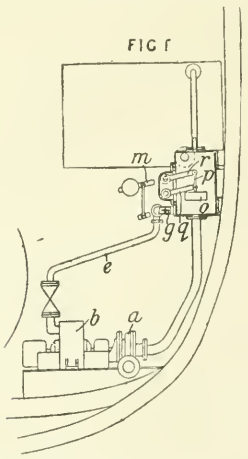
Compiled by Messrs. E. P. Alexander & Son, Chartered Patent Agents, 306, High Holborn, London, W.C.

21,977. Propelling-gear for Ships. Where two sets of propelling engines for driving the same screw propeller are provided, the arrangement is such that one can be used while the other is completely stationary, or both may be used together, this is effected by passing the solid shaft of one engine, such as an internal-combustion engine, through the hollow shafting of the main engine, preferably a steam turbine, suitable clutches being provided for coupling these shafts to the propeller shaft. The smaller engine shaft *a* is coupled by a clutch *b* with a shaft *d* having thrust collars *h*. The shaft *d* passes through the hollow shaft *c* of the main turbine, a clutch *g* coupling the shaft *c* with the propeller shaft *e*. As shown in Fig. 1, the moving forward and



aft of the thrust block *f* of the main engine puts the clutch *g* into gear and the clutch *b* out of gear, and *vice versa*. When the thrust block is fixed, a sleeve *h* on the propeller shaft *e* carries the thrust collars and is keyed to the shaft, so that by actuating nuts on the screwed part of the shaft the latter can be moved longitudinally to effect the clutching and declutching. As shown in Fig. 5, the auxiliary engine shaft *a* is coupled by the clutch *b* to a gear shaft d^1 which is geared by dog clutches *n* to the power shaft *d*. In this form, the auxiliary engine can be geared down to operate with the main engine, or these engines can be used separately as before.

22,749. Turbines. A turbine-driven boiler-feed pump *a* has the steam supply to its turbine *b* regulated by a throttle *g* in a supply pipe *e*, the throttle being controlled from a float *o* located in the feed tank or in a pipe or well connected thereto. The float is carried by a lever-frame *p*, *q*, *r* connected to a



counter-weighted lever *m* linked to the throttle. When the float falls to a predetermined level, the steam supply to the turbine is reduced sufficiently to prevent the pump from delivering water to the boiler, but not sufficiently to cause the shaft to pass through its critical velocity.

The Marine Engineer

And Naval Architect.

LONDON, APRIL, 1913.

DEVELOPMENTS IN BATTLESHIP TYPE.

SKIMMERS AND HYDRO AEROPLANES.

THE fifty-fourth session of the Institution of Naval Architects opened on the 12th of March last, the proceedings being reported in another part of this journal.

The papers read were fourteen in number, and included two on air-craft construction, it being thought by the Council that aviation had arrived at such a stage as to justify the attention of the members. We have dealt with some of the papers, either in full or in summary, in another part of this issue, and propose now to deal shortly with two of the remaining papers. We will take the paper on "Recent Developments in Battleship Type" by Mr. Alan H. Burgoyne, M.P., as being one of the most interesting. The author opens by stating that the subject of this paper has frequently provided the basis of discussion, yet it came with never-ending freshness, for although the basic principle of ship type remains largely the same, the constant advances made in every branch of science tend little to settle opinions or conclusions which for many years now have been matters of controversy. His present object is to review the rapid evolution of the type now in progress, particularly in as far as it touches the battleship, and to analyse the reasons that have led, and are leading, to a closer international unity of design than has hitherto obtained. This is partly due to a curious spirit of rivalry among nations, which is entirely new and is seen in quite minor nations building vessels frankly in excess both of their resources and national needs and in disregard, in most cases, of geographical limitations, which have formerly entered not a little into the consideration of those to whom the framing of programmes is entrusted. The next question dealt with is the factor that controls the development of the ship type. It is taken as an axiom that a warship is solely a means of bringing weapons of destruction into contact with the enemy or by reason of their existence preventing the outbreak of hostilities. The destructive factor, whether gun or torpedo, is therefore the primary basis, and subsidiary to it is the defensive factor, and then follows strategy involving the value of speed as a strategical or tactical asset. With these three desiderata before one it is essential to bring into line the views both of the naval architect and the naval officer, which is a problem of abiding complexity. The author then deals with the influence of size, calibre, etc., of guns, and of the war between guns and armour, and proceeds with the relative merits of the turret and broadside systems of mounting. Reference is then made to the wisdom of reducing the number of calibres in order to enable the "spotting" of the destination of the projectile, and, in fact, to show that the ship type mounting a single calibre is the best for battle purposes.

Having dealt with primary, secondary and tertiary armament, the deductions drawn by the author were that: The *raison d'être* of a battleship being to annihilate, and not merely to injure, the value of a secondary battery as auxiliary to the large guns had disappeared. The acceptance of this tendency to increase in big gun calibre, weight of shell, muzzle velocity and striking energy, an increased ratio of defence was essential to maintain battle worthiness. The necessity of a greater weight of armour, of concentration of force in the main guns required higher displacements. The proper disposition of a large number of main guns to avoid interference called for increased length. The practicability of turbine propulsion for the mightiest units suggested, in its sensible application, an advance in the hitherto standard in battleship speed. The tables and diagrams in the paper are most interesting and instructive, and enable the author's line of argument to be readily appreciated. Turning now to another paper on "The Longitudinal Stability of Skimmers and Hydro Aeroplanes" by Mr. J. E. Steele, B.Sc., we come to a subject widely different from the preceding one, but owing to the growing interest in such craft to the naval architect it is thought that the matter may not be out of place. The investigation dealt with in the paper is limited to the consideration of the longitudinal stability of the machine when wholly or in part water-borne. This is the case all the time with the skimmer, but only partially so with the hydro aeroplane. The author, in opening, usefully defines some of the terms he uses in order to avoid confusion with terms already used by naval architects, and then passes on to the consideration of three types of machine, *viz.*: the skimmer, which skims the surface of the water; the machine which is designed to fly with its tail on the water; and lastly, the machine which rises from and alights on the water, and is at other times an aeroplane. The device of the first type dealt with is the *Miranda IV.*, designed by Sir John Thorneycroft, and having a length of 26 ft., a breadth of 6 ft., and a depth of 2 ft. 6 ins. The author deals mathematically with the forces brought into play under the varying conditions, and then passes on to the next type, which is the monoplane, *Flying Fish*, the fuselage of which consists in a water-tight aluminium tank, 7 ft. 2 ins. long, 5 ft. 7 ins. wide and 2 ft. deep, with a rounded-up bow. The sides of the fuselage are carried aft past the hull for 10 ft., where they are connected by a cross piece, 1 ft. wide, which forms the tail. To facilitate the rising of the fore part out of the water a plane is fitted below the tank part of the body, which plane is tilted up at the fore end so as to ride upon the water. At a moderate speed the fuselage lifts completely out of the water, and the machine glides on the forward plane and the tail. At high speeds the tail only is on the water, all the rest being air-borne, and although fitted with only a single-traction screw in front the machine attains a speed of about seventy miles per hour. The third example he deals with is the Donnet-Lévêque hydro aeroplane, which has proved a great success and is nearer the naval architect's heart than hydro aeroplanes, whose only claim to the additional title consists in small floats being fitted to an ordinary air machine in place of the usual wheels and skids. This machine is a biplane, having the small plane area of only 183 square feet, and attains the remarkable speed of 70 miles an hour. It has a water-tight,

torpedo-shaped fuselage on the lines of a skimmer, and has the characteristic step of the latter. Near the blunt nose of the fuselage is a horizontal elevator, which prevents the nose from diving when alighting and the machine from consequently tripping over. When sufficient speed is attained the after end lifts and the machine glides on the sloping front. After skimming on the surface of the water for about 50 yards an elevation of an elevator fitted at the rear causes the machine to rise bodily into the air. The author sets out very clearly the forces brought into play when using this type of machine, and thus enables one to understand more readily the factors that control safe navigation. In view of the direct interest in aerial work, brought into being by the naval estimates, we welcome papers of this description, it only on educational grounds.

THE NAVY ESTIMATES.

THE Navy Estimates for 1913-14 were issued on March 13th, together with an explanatory memorandum by the First Lord of the Admiralty. The total sum required for this year is £46,300,300, which shows a nett increase of £1,233,400 over the amount for the previous year, *viz.*:—£45,075,400, including the supplementary amount of £990,000 granted last July. It may be pointed out that the increase is largely accounted for under the heads of wages for officers, seamen and other units; of victualling and clothing, and of naval armaments. The vote for shipbuilding shows a decrease of £1,440,300, as it is considered that the contractors, owing to pressure of work and scarcity of labour, will not be in a position to earn more than £12,226,300 as against £13,666,600 provided for last year. The *personnel* is to be increased by a nett amount of 8,500 in order to bring the total of officers and men up to 146,000 on March 31st, 1914. As indicated above the increased cost is made up under this head as to £712,000 for provision for the larger numbers of officers and men, and for increases in pay, and as to £247,900 for increased victualling and clothing, and for the maintenance of reserves of stores. The increases under other heads are so small as to be negligible in dealing with the estimates broadly. Turning to the provision for shipbuilding, £11,224,000 is provided for advancing ships of older programmes and £2,052,400 for commencing ships of the new programme, making a total of £13,276,400 for new construction. As to the new programme this includes five battleships, eight light cruisers, sixteen destroyers and a number of submarines and subsidiary craft. Of these one battleship is to be built at Portsmouth and one at Devonport, and three by contractors; one cruiser at Pembroke, another at Chatham, and six by contractors, while all the torpedo craft are to be built by contractors, with the exception of one submarine at Chatham.

At the commencement of the new financial year there will be under construction eleven battleships, three battle cruisers, thirteen light cruisers, thirty-five torpedo boat destroyers, twenty-one submarines and several other craft, and this list includes the Colonial ships *Malaya*, *Australia* and *Sydney*. We do not think the British public will be satisfied that the five battleships is a proper measure of our responsibility in 1913, as six should have been the minimum laid down, but it looks from the statement of work attached to the memorandum of the First Lord of the Admiralty that he is relying on five ships, because he is proposing to use the *New Zealand* for the First Battle Cruiser Squadron on her return from the colony after her special visit which is at present being made. But it is somewhat difficult to see how the First Lord is maintaining the minimum he has himself laid down as the naval strength in the North Sea, should the Colony change her mind for some reason or other and require the *New Zealand* in other waters before a substitute is built and commissioned. It would seem under these circumstances that prudence would have dictated the laying down of the substitute ship this year instead of delaying dealing with a possible contingency, and we see no reason why the *New Zealand* should have been treated on any different basis other than is suggested for the Canadian warships, in spite of the generous permission of New Zealand to their ship being stationed wherever His Majesty's Government consider her services of most value.

It is to be hoped that Parliament will carefully consider the whole matter when it comes to deal with the estimates, and thus maintain the standard at least that many think is not as high as it ought to be.

MARINE ENGINEERS AND THE ROYAL NAVY.

IN the Annual Report of the Institute of Marine Engineers a suggestive reference was made to the position of the Marine Engineer relatively to the Royal Naval Reserve. This subject is undoubtedly one which calls for serious consideration and careful study, and it is well that the Institute—representative as it is of the Marine Engineer—has at length been awakened to the necessity of dealing with the matter, as it has been already delayed longer than the circumstances of the case warranted. Many thoughtful engineers, who have been alive to the position and possibilities involved by maintaining and fostering a closer connection between the Royal Navy and the Mercantile Marine, have been communicating their thoughts to one another for some time past, and especially lately, in view of what has manifestly been rising on the horizon amid the cloudy haze of coming events. When the Royal Naval Reserve was urged forward so prominently some years ago, not a few were of opinion that a mistake was made in endeavouring to rush engineers in, even to the extent of encouraging companies to vie with one another as to the number of officers—both deck and engine—qualified to place the mystic letters after their names. The wiser course would have been to have left fuller sway to a natural selection induced by healthier considerations. The questions affecting the status of the Royal Naval Engineer then came to the front and were discussed at the meetings of the Institute of Marine Engineers conjointly with the North East Coast Institution of Engineers and Shipbuilders, and a deputation was appointed to set forth the views of the societies before the Admiralty. One result of the representations then made was the present conditions of entry into the Navy—involving a heavy expenditure for a term of years on the part of parents desirous of

placing their sons in training for the Navy, hoping that when they came to years of discretion they would make a wise choice for the quarter-deck or the engine-room. This result was one that did not commend itself to many members of the deputation, and one obvious issue was the discouraging of the R.N.R. engineer, and of the direct entry apprentice engineer, who might by reason of his higher technical training and study—above the average of his fellows—pass the entrance examination and then complete the specialized course for engineer R.N. The ratings of the artificer-engineer and of the R.N.R. engineer appear to be approximately near to one another, while the stoker-mechanician may take rank superior to either. This is a condition which does not commend itself to a marine engineer, whose qualifications admit of his acceptance into the Royal Naval Reserve, and here it seems advantageous in every way to provide an entrance examination for those desirous of joining the Reserve and give encouragement to marine engineers to enter, with a certificate carrying with it some title to rank, superior to those who after all are but amateur mechanicians. Quite recently an invitation has been issued to lads of 16 to 17 years of age of good education and ability, to make application for entrance into the service by examination. Successful candidates are to take a course of study and training at the Admiralty College, after which they enter as midshipmen and are due for promotion in regular course. The subjects for the entrance examination are mathematics, mechanics, chemistry, subjects indeed which the educated young marine engineer has studied in his school days, hence it is all the more desirable that the Reserve should be revived and revivified under new conditions, amended and altered as may be deemed necessary to meet requirements. The modern engineer of the Mercantile Marine is a man of education and training, meet for the responsibilities which he has to take upon himself, with instincts alive to the duties of his office, and with a just pride in the efficient working of his machinery. These qualities render him valuable to his employer, and when it is considered that the qualities which enable the engineer to be invaluable to the success of the merchantman, and, consequently, to the prosperity of the nation in commerce, equally enable him to be of service in connection with the Royal Navy, but in order to be in a position to give that service in a critical time, he requires to have some specialized experience, and it would be well that a good reserve should be built up, composed of engineers who have received this specialized experience from opportunities afforded them, subject to conditions alike favourable to all concerned. In other words there are means at hand for adding to the "stand by" of the national resources in time of need, and it appears to be sound wisdom and judgment to make use of these means.

S.S. "King Orry."—Messrs. Cochran & Co. (Annan), Ltd., have supplied this vessel, which was recently launched by Messrs. Cammell, Laird & Co., Ltd., for the Isle of Man Steam Packet Co., with a Cochran (Annan) donkey boiler, fitted with patent seamless furnace.

Oil Power.—The proprietors of *Cassier's Magazine* have just issued a special oil-power number containing articles from the pens of the best authorities on these subjects. All the articles are profusely illustrated and embrace a wealth of information.

MARINE MOTOR NOTES.

The battle of the two-cycled and the four-cycled oil engine is becoming as exciting as the battle of the boilers was a few years ago, when both from an engineering and a commercial point of view advocates of the water-tube boiler met the defenders of the Scotch boiler in argument, armed with data of a more or less convincing quality. The "Paragon" type of engine, recently brought out, promises to make itself a character in keeping with its name, according to the description of its cycle of operations and the method pursued in its design and setting, with a view to obtain as full a value as possible out of the fuel. The designer and joint patentee is an enthusiast and is ever on the move to effect economies by seeking to obtain the highest calorific value out of the prime mover and the highest propeller efficiency by the introduction of a reducing agent, electrical and mechanical but with a decided leaning to the former. The "Paragon" engine is designed for either the two or the four-cycle, aiming in each case at the highest thermal efficiency. Our attention has been called to another design which has been the outcome of much patient labour and may shortly be introduced when it has been further developed. The recent trials of the two-cycle motor vessel *Hagen* for oil carriage, built by Messrs. Krupp for the German-American Petroleum Co., have shown results of a very satisfactory character in the power developed and the speed attained. The vessels now in course of building for different companies, added to those which are under consideration, will make quite a large amount of tonnage. The Atlantic transport vessels will be a most interesting trio, oil fuel for producing steam in boilers; oil fuel for internal combustion engines, and coal for producing steam. The engines in each case of the three vessels will be the most efficient present day types. The *Juno*, *Selandia* and *Christian X.* and other vessels fitted with oil engines appear to be giving good accounts of themselves, and we note that in the course of the adjourned discussion on Mr. Zulver's paper, published last month, it was stated that the *Juno* had been running experimentally and successfully on taracan oil, a sample of which was shown to the meeting of the Institute of Marine Engineers and was described as an unrefined or crude oil. Formerly solar oil was in use in order to give the engines every chance of showing what they could do under the most favourable conditions before attempting economies in quality of fuel supplies. The keen controversies which have been evoked as to the available quantities of coal and oil in the world to meet the growing requirements, with the probabilities as to prices and relative values, have also had the effect of rekindling the possibilities with regard to the distillation of a suitable spirit from vegetable tissue, cultivated to meet the demands of the market, thus relieving to some extent the increasing prices. The question of the duty upon such a distillation is one which has many side issues, ranging from the pleasant paths dedicated to the luxuries of the comparative few to the wants or even necessities of the many, and this latter issue comes into consideration when cost of transit or locomotion affecting the carriage of goods and produce has to be carefully gone into.

The following is an extract from a letter received from the captain of a passenger steamer. It would be of considerable interest to know if the incident related has been experienced by others:—On the 18th February, at 9.10 a.m., we were in 2° North Latitude and 10° 48" West Longitude when the ship was struck by lightning quite unexpectedly, as there were no signs of lightning or thunder in the vicinity. The sky was cloudy and two waterspouts were visible on the horizon. A dazzling ball of fire came from a cloud on the starboard quarter and exploded in the water near the ship. A terrific clap of thunder was heard, and the lightning played on our masts, rigging and funnel, and along the Marconi aerial wires. The Marconi operator was sitting near his instrument listening for messages when he received a severe electric shock, which sent him backwards against the partition of his cabin. We immediately examined our compasses and found that two of them were deflected; one was deflected 7° and the other 2° and they have not yet recovered. Our passengers were very much startled but no one was hurt.

THE INSTITUTION OF NAVAL ARCHITECTS.

THE spring meetings of the 54th session of the Institution of Naval Architects were opened in the Hall of the Royal Society of Arts on March 12th, and continued on the 13th and 14th of the month. The Marquis of Bristol, President of the Institution, occupied the chair.

The first business was the presentation of the

Annual Report of the Council,

of which an extract is appended :—

The Council have pleasure in stating that the affairs of the Institution have continued to prosper. The membership of all classes totals 2,013 as against 2,110, 1,984 and 1,805 respectively in the three preceding years. The death of Sir William White, K.C.B., F.R.S., Honorary Vice President, means the greatest loss to the Institution, and the Council desire to record the deep sense of the obligation which they feel is due to the memory of one who has contributed so largely to bringing the Institution into the position it now occupies. The encouragement given to Students of Naval Architecture by the offer of Scholarships has been further developed by a generous gift of £1,500 from Mr. A. F. Yarrow to permanently endow the "Institution of Naval Architects" Scholarship, to which he had originally contributed the amount required for the first six years. In making over this gift, Mr. Yarrow suggested to the Council the propriety of increasing the annual value of the Scholarships administered by them to £100 each. The Council have accordingly resolved to make up the deficiency out of surplus revenue, and they trust that this step will tend to increase the number of candidates and stimulate the interest taken in this educational movement. The award of the Institution of Naval Architects Scholarship for the past year has been made to Mr. W. J. Drummond, a private student of the Royal Naval College, Greenwich, where he is now following the Course in Naval Architecture. The Post-Graduate Scholarship of £200 per annum, given by the Royal Commissioners of the 1851 Exhibition, has this year been awarded to Mr. Percy Brimblecombe, B.Sc., a Student of the Institution, who has entered upon a course of research work at Armstrong College, Newcastle-on-Tyne.

The Council have elected Sir William E. Smith to represent the Institution on the Board of the Imperial College of Science and Technology in the place of Eng. Vice-Admiral Sir John Durston, K.C.B., resigned; and also on the Engineering Standards Sub-Committee for the testing of shipbuilding materials in place of the late Mr. James Dunn.

The Twelfth International Congress of Navigation was held in Philadelphia last May, and the Institution was represented there by Mr. J. Foster King. At the Sixth International Congress of the Association for Testing Materials, which was held in New York last September, the Institution was represented by Mr. Stevenson Taylor, President of the American Society of Naval Architects and Marine Engineers. Dr. Archibald Denny, was one of the representatives of His Majesty's Government at this Congress.

The terrible disaster which overtook the s.s. *Titanic* on her maiden voyage last April aroused world-wide sympathy and interest. The calamity was one that touched the members of this Institution very closely, and the Council desire to take this opportunity of recording their admiration of the splendid heroism shown by the members of the engineering staff, and of Mr. Thomas Andrews, Member of the Institution, of the firm of Messrs. Harland & Wolff, who went down with the ship. In addition to the Commission appointed to enquire into the catastrophe two Committees have been appointed by the Board of Trade, one on Bulkheads, under the chairmanship of Dr. A. Denny, and the other on Boats and Davits, under that of Professor J. H. Biles, these committees being formed to a great extent of members of the Institution.

The draft rules relating to the Safety of Life at Sea which the Board of Trade submitted to Parliament last October gave rise to considerable criticism in various quarters, and the Council, at the desire of some of its members, appointed a Committee, under the Chairmanship of Sir William E. Smith to enquire into and report upon the proposed changes in the Board of Trade regulations. It was ascertained, however, that strong representations had already been made directly to the Board of Trade by shipowners and others, and that considerable alterations were being introduced into the new regulations which would eliminate the difficulties presented in the original draft. Under these circumstances the Council decided to proceed no further with the matter at present.

A Royal Commission has been appointed to enquire into the supply and storage of oil fuel and its application to warship engines. The Commission is under the chairmanship of Admiral of the Fleet Lord Fisher of Kilverstone, and the following Members of Council of the Institution are serving upon it: Sir Philip Watts, K.C.B., Eng. Vice-Admiral Sir Henry Oram, K.C.B., Mr. Alexander Gracie, M.V.O., and Mr. A. F. Yarrow.

An invitation has been received from the Institution of Engineers and Shipbuilders in Scotland to hold a Summer Meeting in Glasgow this year, which the Council have accepted on behalf of the Institution. The date selected is June 24th to 27th, and it is anticipated that, in view of the great shipbuilding activity now prevailing on the Clyde, an interesting and profitable meeting will be held.

The Annual Gold Medal for 1912 has been awarded to Admiral Sir Reginald Custance, K.C.B., K.C.M.G. (Associate), for his paper on the Military Principles which bear on Warship Design. Premiums have been awarded to Professor Gümbel (Member) for his paper on the Torsional Vibrations of Elastic Shafts, and to Mr. A. Cannon (Associate Member) for his paper on the Effect of Internal Fluid upon a Ship's Stability.

Election of Officers.

After the report had been adopted the names were read of the list of Vice-Presidents for the year, as follows:—Lord Pirrie, Eng. Vice-Admiral Sir J. Durston, Eng. Vice-Admiral Sir H. J. Oram, Sir Philip Watts, Sir W. T. Doxford, Sir Charles A. Parsons, Sir W. E. Smith, Prof. J. H. Biles, Mr. H. J. Cornish, Dr. A. Denny, Mr. A. Gracie, Mr. R. H. Humphrey, Mr. J. T. Milton, Mr. S. P. Thearle, and Mr. A. F. Yarrow. In addition there have been elected—as Vice-President, Mr. S. W. Barnaby; and as members of Council, Mr. P. T. Caird, Mr. H. R. Champness, Mr. G. J. Carter, Rear-Admiral G. G. Goodwin, Mr. J. McKechnie, Sir James Marshall, Mr. J. R. Perrett, Mr. Tennyson D'Eyncourt, Prof. Welch and Eng. Commander Wisnom; and as Associate Members of Council, Admiral Sir R. Custance, K.C.B., Sir J. A. Ewing, K.C.B., and the Right Hon. Lord Inverclyde.

Presidential Address.

The Marquis of Bristol referred in his presidential address to the great loss sustained by the recent death of Sir William White and drew attention to the great work he had done in the advancement of the scientific side of naval architecture. The President pointed out that remarkable progress had been made during the last year in building sea-going ships fitted with marine oil engines. There were at present under construction at home and abroad 35 such vessels, with an aggregate tonnage of 151,000 and an indicated horse-power of the oil engines exceeding 113,000. British progress in the construction of aircraft had been somewhat retarded by lack of encouragement and insufficient funds under Government votes. As a measure of national safety there was reason to press for recognition of the importance of the new weapon that was being forged with much skill and enterprise by other Great Powers. The problems involved could best be dealt with by those who had been trained to grapple with them in the similar problems of naval architecture and marine engineering; but more encouragement was needed if the best men for the work were to be attracted to it. The activity of the shipbuilding industry continued unabated and the increase in the number of ships of large size built continued to be a marked feature in the returns.

The Annual Dinner.

The annual dinner of the Institution was held on the 12th March, in the Connaught Rooms, and the Marquis of Bristol presided over a very large and distinguished company.

Lord Hythe proposed "His Majesty's Oversea Dominions," and The Hon. Thomas Mackenzie (High Commissioner for New Zealand) responded. He said that the Oversea Dominions were prepared, according to their ability, to contribute to Imperial defence. He was quite aware that that must involve some sort of representation, and in the meantime they

must prepare themselves for a truly Imperial Parliament to which each portion of the Empire would send representatives in proportion to their populations or their contributions, or upon some fixed equitable basis. Personally he believed in one Imperial Navy. It was a matter of controversy at present, and while he was free to express his own individual opinion, he was not prepared to give the views that his Government might hold upon that particular question.

The Papers.

During the meetings the following papers were read and discussed :—"Recent Developments in Battleship Type," by Alan H. Burgoyne, Esq., M.P.; "The Influence of Air-pumps on the Military Efficiency of Turbine-engined Warships," by D. B. Morison, Esq.; "Mechanical Gearing for the Propulsion of Ships," by the Hon. Sir Charles A. Parsons; "Compressed Air for Working Auxiliaries in Ships Propelled by Internal Combustion Engines," by W. Reavell, Esq.; "The Energy Systems accompanying the Motion of Bodies through Air and Water," by Professor J. B. Henderson; "The Calculation of Stability in Non-intact Conditions," by Professor W. S. Abell; "Notes on Modern Airship Construction," by Baron A. Roenne; "The Longitudinal Stability of Skimmers and Hydro-aeroplanes," by J. E. Steele, Esq.; "On Large Deck Houses," by J. Foster King, Esq.; "Methodical Experiments with Mercantile Ship Forms," by G. S. Baker, Esq.; "Launching Declivities for Ships, and their Influence upon Poppet and Way-end Pressures," by A. Hiley, Esq.; "Stresses in Stayed Cylindrical Shells," by C. E. Stromeyer, Esq.; "The Distribution of Stress due to a Rivet in a Plate," by Professor E. G. Coker, and W. A. Scoble, Esq.; "Stresses in a Plate due to the Presence of Cracks and Sharp Corners," by C. E. Inglis, Esq.; some of which we deal with in this issue.

AUSTRIAN STEAMER "AMBRA."

On March 5th, the large steel cargo steamer *Ambra* had a most successful trial trip. This vessel has been built by the Cantiere Navale Triestino Monfalcone for the Navigazione Libera Triestina Pollich & Co., Ltd., Trieste, and is a sister ship of s.s. *Perla*, delivered last November, and the s.s. *Spuma* still on the stocks. The leading dimensions of the vessel are—length, 390 ft. between p.p.; breadth moulded, 53 ft. 9 in., and depth, 32 ft. to shelter deck, and she has been built under special survey to Lloyd's and Austrian Veritas highest class as a shelter-deck steamer.

The *Ambra* is fitted with five large hatches and steel longitudinal bulkhead, grain tight under upper deck. The cellular bottom, all fore and aft, and peaks are fitted as ballast tanks with a capacity of 1,620 tons, and on a draught of 24 ft. 8 in. will be able to load 8,500 tons deadweight, including 700 tons of coal bunkers. Spare cabins, saloon, officers and engineers' accommodation are arranged in two large houses on shelter deck amidships, and another house for twenty-eight members of the crew with bath, washhouses and w.c. is built aft. Electric light is fitted throughout. The three boilers are of the marine return tube type, built under Lloyd's survey for 180 lbs. working pressure. The vessel's specification speed was 11¼ miles, but this was exceeded on the trial, a speed of 12¾ knots being attained.

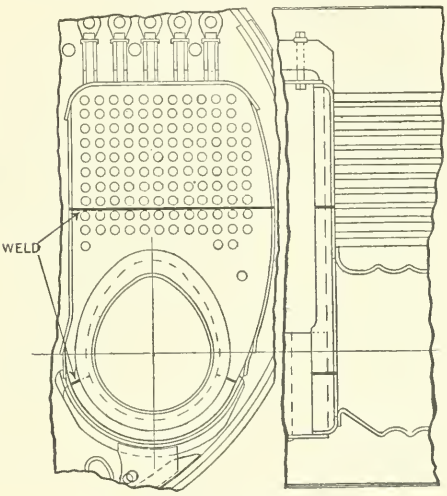
The *Ambra* and her sister ships, designed by Mr. Andrew Munro, chief draughtsman of Cantiere Navale, are the best designed cargo boats of the country

The Cantiere Navale will deliver next November to her owner, Mr. M. U. Martinolich, a large single-deck cargo steamer of the following dimensions :—Length, 420 ft.; breadth, 54 ft.; depth, 30 ft. 6 in. moulded. She is of the long bridge type with short forecastle and poop, and will carry 9,600 tons deadweight. The very light construction of this vessel is very interesting because in proportion she is the highest in the world without hold stringers or other special strengthening; the height of hold is 27 ft. at sides.

Modern Systems of Ship Construction.—A lengthy illustrated article on some of the modern methods of ship construction was published in our January issue. Only a few copies are in stock, and application should be made at once.

ELECTRIC WELDING PROCESS FOR REPAIRS.

The welding of even critical parts of boilers is now a matter of every day occurrence in the experience of those who have made it their business to operate the welding plant. During the past few years our attention has been called to a number of cases of considerable interest, and the more important of these have been illustrated in our pages. The welding of a new upper portion to a tube plate—necessitated by the collapse of a combustion chamber crown and incidentally noted in a recent issue—was successfully carried out to the Board of Trade test. Another piece of work on a tube plate, executed recently, consisted of welding on a new flanged back ring, made to templet to meet the furnace flange and carried up to the line of the bottom row of tubes where it was welded to the original tube plate. This



New lower portion of tube plate welded in.

repair was found to be necessary, owing to cracks which had developed in the flanged back of the tube plate to such an extent that the portion showing the cracks had to be cut away. The new patch required to be made in two pieces to admit of being passed through the furnace, and after being riveted up in place to the furnace tube back and to the bottom combustion chamber plate, the parts were welded together into a continuous ring. These repairs, which we had the opportunity of seeing in progress, were effected by the British Arc Welding Company, of Regent Dry Dock, Millwall, London, who kindly forwarded a catalogue illustrating some of the work which had been dealt with by the firm. The illustration shows a tube plate, the lower portion of which, embracing two rows of tubes, was renewed and welded between the second and third rows—a critical enough job to test the efficiency of the plant and the welder, whose personality is a most important factor in connection with the outfit.

"Titanic" Engineers Fund.—The amounts to the credit of this fund are as follows :—

Inst. of Marine Engineers, March 22nd..	..	£2,735	0 0
Southampton Committee (no change) ..	..	£1,682	0 0
Liverpool Committee, March 22nd ..	..	£5,240	0 0
Total	..	£9,657	0 0

COMPRESSED AIR FOR WORKING AUXILIARY MACHINERY IN MOTOR VESSELS.

By W. Reavell, Esq.

THE object of this paper is to show the advantages of compressed air for working auxiliary machinery in motor vessels, and to discuss the conditions under which it can be most efficiently employed. The auxiliaries which, in an ordinary cargo boat, lend themselves at once to separate treatment are the steering engine and the whistle, for even if these are operated by steam in the time-honoured way in a ship with internal combustion engines, when all the rest of the auxiliaries are worked by steam, it seems unnecessary to maintain steam during the whole of an ocean voyage simply to supply the steering engine or a whistle, and several ships have been, or are being, fitted with means for supplying compressed air for this purpose, so that, on leaving port, the donkey engine may be shut down.

Numerous figures have been obtained by the author in order to ascertain the probable air consumption of a steering engine of the ordinary steam type usually used, and, as might be expected, it was found that when a ship is on her course at sea, the quantity of air required for steering is very much less than that which is required when a ship is being navigated in crowded waters up to her berth. When steam, however, is used for auxiliaries, this power can be retained until the ship is at sea, when the donkey boiler may be shut down and air instead of steam used for steering. If steam is not used for auxiliaries, the provision to be made for navigating narrow waters is discussed later.

The basis on which the author has computed the amount of air required for steering has been to ascertain the cubic contents of the steering engine cylinders per revolution to note the pressure required to throw the helm hard over when the ship is running at full speed, and from these figures to ascertain the equivalent quantity of free air at atmospheric pressure which would be required per revolution. All that is required then is to note the varying revolutions made by the steering engine as the conditions vary from minute to minute during any particular trial, when not only can the maximum and the minimum demands for air be ascertained, but the average quantity which is needed. From these figures the size of the compressor and the capacity of the storage reservoirs can be determined.

Figure No. 1 shows a diagram in which the fluctuations in the air required from minute to minute are shown, these being plotted from figures taken on the trial trip of the s.s.

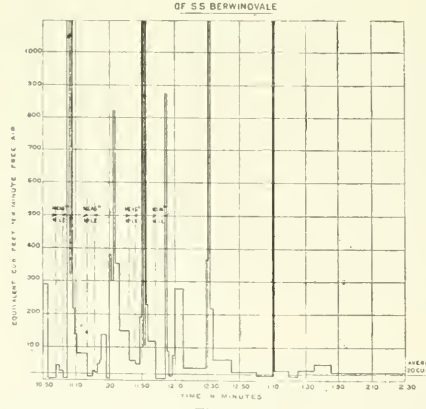


DIAGRAM SHEWING VARIATION IN DEMAND FOR STEAM
ON THE STEERING ENGINES AT THE TRIAL TRIP
OF SS BERWINDALE
EQUIVALENT CUB FEET FREE AIR PER MINUTE
TIME IN MINUTES
AVERAGE 1000 FT

Fig. 1.

DIAGRAM SHEWING MINIMUM EQUIVALENT AMOUNT OF FREE AIR REQUIRED TO OPERATE STEERING ENGINES
OBSERVATIONS TAKEN ON BOARD S.S DEUTSCHLAND ON THE VOYAGE TO
NEW YORK 10TH APRIL 1911
TIME IN MINUTES

Fig. 2.

Berwindvale, through the courtesy of Messrs. Sir Raylton Dixon & Co. The ship is 405 ft. long, 54.2 ft. beam, and has engines of 3,200 i.h.p. and a speed of 12 knots. The effect of the rapid movement of the helm when the ship is turning when entering and leaving the measured mile is clearly shown, together with the steady running on the mile. The demand for air when turning is at a very high rate, but, on the other hand, the period of this large demand is very short. Attention is particularly drawn to the average air which would be required for a steering engine on a ship of this size when on her course after her trials, as shown between the hours of 1.10 p.m. and 2.30 p.m. on the diagram, when the average air consumption for this period is only 20 c.f. free air per minute.

One of the companies for whom the author's firm has designed a compressed air steering equipment is that of the Reiherstieg Schiffswerfte und Maschinenfabrik, of Hamburg, who, it is well known, have completed a Carels-Diesel engine of about 2,000 h.p. In order to obtain precise results, this firm kindly arranged with the owners of the ship for exact particulars to be taken each day on a sister ship making a voyage to and from America, and equipped with steam engines and boilers, and therefore having steam steering gear. Complete records were taken of the revolutions of the steering engine during one watch each day on both the westward and eastward course. Fig. 2 shows one of these diagrams taken under the best conditions of wind and sea, while Fig. 3 shows a similar diagram plotted from observations taken during stormy weather. These are considered to represent the maximum and minimum conditions. As a result the design of steering compressor shown on Fig. 4 was constructed for their ship. A steering equipment on these lines is successfully at work on the m.s. *Rolandseck*, with Diesel engines by Messrs. Joh. C. Tecklenborg, A.-G., of Geestemünde, and the results at sea show that under the worst conditions there is ample air for steering. The steering compressor is of a double pressure type, and is of simple construction, and arranged to be driven by levers from the main engine as shown on the illustration. Most of the air compressed and delivered by this compressor is supplied at the normal pressure which would be used by a steering engine if steam driven. The air is supplied to a reservoir A, and from thence to the steering gear. The remainder of the air is compressed to a much higher pressure, and delivered into reservoir B, which holds it as stored air for an emergency.

The valves for both the low-pressure and high-pressure air are controlled from the receivers A and B in such a manner that if both of these receivers are filled to their desired pressure the compressor is unloaded and throws no work upon the engine at all. With a system like this the compressor may be generously proportioned so as to be of ample size, even in heavy weather, because, under favourable conditions, it will run unloaded for most of its time. Circumstances might arise, however, where, *e.g.*, with the ship going at half speed in fog or ice, the helm is required to be thrown hard over once or twice in quick succession. It is for an emergency such as this that the high-pressure storage air reservoir is provided. A specially constructed and automatically controlled valve is fitted on or between the two reservoirs, and is controlled by the pressure in A. When this pressure falls below a pre-determined figure, the stored air passes from B into A to supplement that supplied by the low-pressure portion of the compressor, and the compressor at once begins to supply air at the high pressure also in order to replenish the high-pressure receiver B.

The use of low-pressure air from the three-stage compressor on the marine engine itself has been suggested for steering gear, instead of an independent compressor, and by the

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courtesy of Messrs. Furness, Withy & Co. the author is able to state that on the m.s. *Eavestone*, with Carels-Diesel engines, the surplus air supplied by the Reavell three-stage compressor has been successfully used instead of steam in the steering gear of that ship on two complete voyages. This, of course, is only possible where the three-stage compressor, from the dictates of safety, has been made unduly large and for several reasons, which it is beyond the scope of this paper to discuss, it is much more economical to construct the main three-stage compressor of proper size for this work and to supply a properly constructed steering compressor, with its reservoirs, for steering, rather than to run the risk of prejudicially affecting the proper operation of the main compressor, which has such an important function to perform in the Diesel engine.

Cargo Work.—Compressed air having been demonstrated to be so simple and suitable for steering purposes, it follows that the donkey boiler is being carried permanently in the ship simply for the operation of the winches when in port, because, in an ordinary cargo boat, if the winches are successfully dealt with by another motive power, there is no other purpose for which steam is now used which cannot be served by another power. The author's attention has for some time been directed, therefore, to the determination of the actual conditions under which deck winches operate, so as to find the conditions under which air can be most efficiently substituted for steam. The results of these investigations which are given hereafter, show clearly that a different understanding is required between the shipowner, the shipbuilder and the engineer before air can be successfully used. The author recollects investigating closely the compressed air equipment demanded to fulfil the requirements of a specification sent to his firm for an earlier Diesel engine ship. It was demanded that the winches—eight in number—should be capable of simultaneously lifting their maximum load of 5 tons at 80 ft. per minute with a pressure of 100 lbs. per square inch of compressed air. The resultant compressor calculated from this data was of such a size that it required an engine nearly half the size of the main propelling engine in the ship to drive it.

The author then commenced a series of investigations to ascertain the exact conditions under which in an ordinary cargo or coasting steamer the 3-ton or 5-ton winches operated. These investigations showed that 5-ton winches do *not* normally lift 5 tons at 80 ft. per minute; that the pressures usually found in the cylinders of winches are far less than 80 lbs. per square inch; that all of the winches do not always work together; that the portion of the complete cycle of the operation of a winch during which work is being performed is relatively small. For example, in hoisting bales of goods from a hold to the quay the demand for steam is practically limited to hoisting, while the operation of slewing, lowering, hoisting the empty hook, slewing and lowering to hold required practically no power.

Under these conditions it will be readily seen that with sound engineering co-operation between the shipowner, ship-builder and engineer, a compressed air plant of relatively

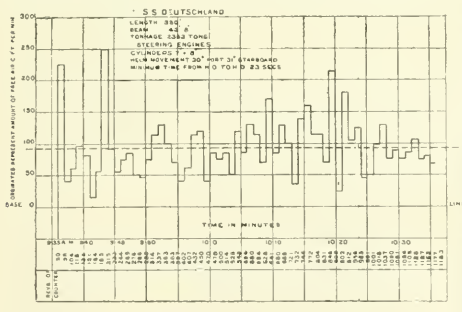


Fig. 3.—Diagram showing maximum equivalent amount of free air required to operate steering engines Observations taken on board S.S. *Deutschland* on the voyage to New York, 6th April, 1911.

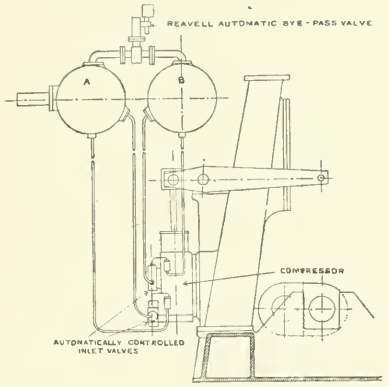


Fig. 4.—Diagrammatic arrangement of Reavell Steering Compressor and Air Reservoirs.

small size can be used and will be sufficient. Opportunities were given to the author, through the courtesy of Mr. Roxburgh, of the Powell Line, to take complete figures of the unloading of a coasting steamer, the *Norfolk Coast*, in the port of Ipswich and at Liverpool. The winches were of the Wilson chain-driven type. Table 1. shows the result of these investigations in Ipswich Docks.

Table 1.—Observations made on S.S. "Norfolk Coast" at Ipswich.

Winch, port side of fore hatch.

Hoisting.			Lowering to hold.	Total time complete cycle.		Total Weight.	Average steam pressure, to lbs.
Taking up slack.	Raising.	Total.					
sec.	sec.	sec.	sec.	min.	sec	cwts.	
4	12	16	5 approx.		55	7	
6	10	16	,,	1	39	3	
6	10	16	,,	1	42	7	
15	11	26	,,	1	8	7½	
7	7	14	,,	1	55	7½	
12	6	18	,,	1	18	7½	
5	9	14	,,	1	21	8	
7	7	14	,,	1	36	3½	
5	9	14	,,	1	29	8	
16	12	28	,,	1	29	7½	
2	12	14	,,		41	5	
13	11	24	,,	2	6	7½	
8	7	15	,,	1	7	3½	
4	9	13	,,	1	32	9	
5	10	15	,,	1	11	4	
7	7	14	,,	2	7	9	
15	12	27	,,	1	22	7½	
8	12	20	,,	1	28	8	
5	12	17	,,	1	43	3½	
5	10	15	,,	1	15	8	
4	8	12	,,	1	17	3½	
10	11	21	,,	1	45	7½	
2 min 49 sec	3 min. 34 sec	6 min 23 sec	—	32	6	142½	
Average 7·7 secs.	9·7 secs.	17·2 secs. At rate of 13·6 tons per hour.		1	27½	6½	

Dealing with the cycle, it will be observed that the average complete cycle of one winch occupied 87½ seconds, while out of this period the lifting operation occupied only 17·2 seconds, or only one-fifth of the total cycle. It will also be observed that the average weight of the bales did not exceed 6½ cwts. The most interesting part of these investigations, however, relates to the pressure actually required to operate the winch freely under these conditions. There was a pressure in the deck pipes of 90 lbs. per square inch, and a low reading pressure gauge was attached directly to the steam chest of the winch, and the stop valve on the winch adjusted so as just to give a sufficient flow of steam to enable the winch to run freely to the satisfaction of the stevedore. The maximum pressure observed during the whole of the investigations did not exceed 16 lbs. and the average pressure was about 10 lbs.

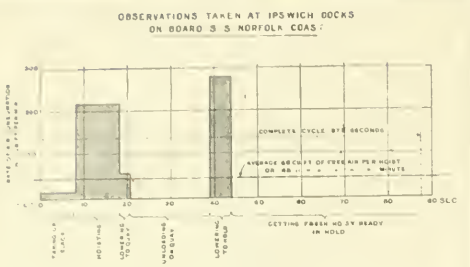

OBSERVATIONS TAKEN AT IPSWICH DOCKS
ON BOARD S.S. NORFOLK COAST
COMPLETE CYCLE 87½ SECONDS
AVERAGE AMOUNT OF FREE AIR PER HOIST
OR 48 " " " " MINUTE
TAKING UP SLACK
HOISTING
LOWERING TO LAY
UNLOADING CARGO
LOWERING TO HOLD
GETTING FRESH HOIST READY IN HOLD

Fig. 5.

per square inch. The average pressure during unloading of the same vessel at Liverpool was 12 lbs., the average weight of the goods being slightly greater.

Fig. 5 shows in diagrammatic form the maximum and minimum demands for air in a winch operating under these conditions, and with suitable air reservoirs and pressure control shows also what would be the average air to be supplied by the compressor. By the courtesy of Mr. Adams, of the Shaw Savill Line, a number of observations were taken on the S.S. *Rangatira*, fitted with twelve "Wilson" winches. Accurate figures were obtained from the performance of one winch to obtain the maximum and minimum pressures and average time cycles, while the average loads lifted by the other winches were noted. The average weight of load lifted was found to be approximately 12 cwts. with an average cycle of two minutes, and the heaviest lift observed during the day was 30 cwts. With this load a pressure of 20 lbs. was sufficient to lift it slowly, and 40 lbs. to lift rapidly. The pressure required to lift the average load at full speed was 20 lbs. The average time of actual lifting was 10 seconds, giving a ratio to total average cycle of 2 minutes of 1 to 12. A calculation based on these observations shows that in a vessel of this size and power (5,000 h.p.) the engine of the auxiliary or manœuvring compressor, if the ship were equipped with Diesel engines, would be amply able to drive in port a compressor arranged to operate the deck winches with compressed air on this low pressure basis.

By the courtesy of Messrs. R. & W. Paul, Ltd., of Ipswich, the author has been enabled to take accurate observations of the performance of steam winches when whipping grain cargoes in Ipswich docks. Two ships, the s.s. *Blackfriar Gate* and the s.s. *Brookby*, were selected, each of approximately 5,000 tons cargo capacity, and having five cargo holds, dealt with by five winches built by Messrs. Clarke, Chapman and Co., the winches being 7 by 10. The pressures were observed in the same manner as heretofore, and when whipping two sacks, each of 240 lbs., or a total of 4½ cwts., at an average speed of 300 revolutions per minute, corresponding to about 120 ft. per minute hoisting speed, the average steam pressure observed in the steam chest of the winch was between 16 and 20 lbs. per square inch.

Other observations taken on other vessels, with a pressure gauge fitted directly on to the winch cylinders in each case, show that the steam pressure actually used in the normal working of the winches, whether lifting bales of goods or whipping grain or dealing with other cargoes, is very much less than the specification of 80 or 100 lbs. usually asked for. Further, the largest percentage of goods carried, say, by a coasting steamer or a passenger and cargo steamer, or any general cargo boat dealing with other than grain or coal cargoes, are of much less weight than the maximum for which the winch is constructed. It follows, therefore, that they can be dealt with at a correspondingly low pressure in the winch cylinders. It only remains to consider, if a lower pressure is used with air, what should be done in the small percentage of cases where a heavy lift is required.

An investigation into this has shown that a heavy lift is usually of an irregular shape, which cannot be efficiently dealt with at a high rate of speed, such as 80 ft. or 100 ft. per minute in an ordinary cargo boat, so that with suitably arranged back gear in the winch these heavy loads when required can be also lifted with a low pressure of air. At this juncture, therefore, the author would point out that the conditions of air-operated winches differ entirely from steam winches from this point of view of pressure. Indeed, the steam analogy is a false one when applied to air problems. Further, paradoxical as it may seem, the best overall efficiencies with air can be shown to be obtainable, other things being equal, when the pressure is low rather than when the pressure is high. When once the latent heat of the water is overcome and steam is produced, the extra cost of raising that steam to a pressure of 100 lbs. per square inch is negligible. With air, however, every pound of extra pressure which is desired has to be first put into the air in the air compressor at the expenditure of an equivalent amount of power in the motor driving it. Hence it is that earlier attempts to deal with cargo problems on the old lines with compressed air have been wasteful, and the above are the lines on which it is possible to economically operate deck winches by air pressure. A reference to Fig. 6 will illustrate this point. In the two diagrams there given, one shows the diagram resulting from the compression of air in one stage to 100 lbs. pressure, assuming an absorption of four-tenths of the heat of compression; the other shows the resulting diagram when compressing to 20 lbs. pressure under the same conditions. If the air, when compressed, is to be used in a deck winch, the remaining heat of compression (in hatched lines on diagram) which is found in the delivered air will have been lost in the receiver, and the air will pass to the winches practically cold. The shaded portion, therefore, shows that amount of the diagram which represents the compressed air which can be used in the winch.

For the high-pressure system it will be seen that the ratio of the available energy in the air to the work done upon the air in the compressor, excluding mechanical loss, is as 1 to 3·28. With the 20-lbs. pressure diagram, however, the ratio of the work available to the work done on the air is as 1 to 1·67. In other words, the efficiency expressed in these terms of the low pressure system compared to the high is as 2 to 1 under the above conditions of pressure. As to the power required, the diagram shows that three times the energy is needed to compress the air to 100 lbs. as compared with that required for 20 lbs. If, therefore, it is accepted that the lower pressures here dealt with are sufficient, it will be seen that the Diesel or semi-Diesel engine used for driving the auxiliary compressor can at once be reduced to one-third the power which will be required if the air is compressed to 100 lbs. The next point to observe is that the quantity of free air required to fill the cylinders of a winch at 100-lbs. pressure is more than three times as great as that required to fill the cylinders to 20 lbs. pressure, so that the compressor required will be one-third of the size, and the power required to drive it will again be reduced to one-third, or one-ninth of what would be required for the larger machine at 100 lbs. pressure.

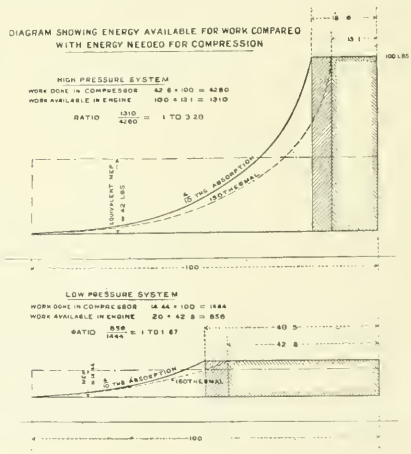
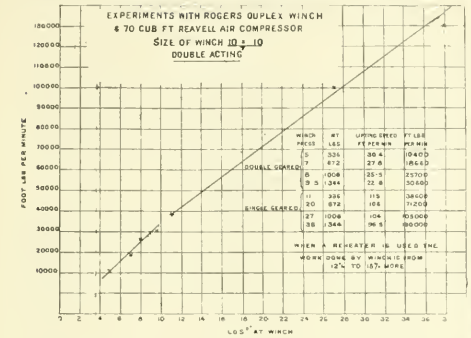


DIAGRAM SHOWING ENERGY AVAILABLE FOR WORK COMPARED WITH ENERGY NEEDED FOR COMPRESSION
HIGH PRESSURE SYSTEM
WORK DONE IN COMPRESSOR 42 8 × 100 = 4280
WORK AVAILABLE IN ENGINE 100 × 13 1 = 1310
RATIO 1310/4280 = 1 TO 3·28
100 LBS GAUGE
EQUIVALENT MEAN
14 7 ABS
10% HEAT ABSORPTION
ISOTHERMAL
LOW PRESSURE SYSTEM
WORK DONE IN COMPRESSOR 14 44 × 100 = 1444
WORK AVAILABLE IN ENGINE 20 × 42 8 = 856
RATIO 856/1444 = 1 TO 1·67
40 5
42 8
14 7 ABS
10% HEAT ABSORPTION
ISOTHERMAL

Fig. 6.


EXPERIMENTS WITH ROGERS DUPLEX WINCH
& 70 CUB FT REAVELL AIR COMPRESSOR
SIZE OF WINCH 10 × 10
DOUBLE ACTING
FOOT-LBS PER MINUTE
LOSS AT WINCH
WINCH PRESS | AIR LBS | LIFTING SPEED FT PER MIN | FT LBS PER MIN
DOUBLE GEARED
5 | 336 | 38.4 | 10400
7 | 672 | 27.6 | 18600
8 | 1008 | 25.5 | 25700
9.5 | 344 | 22.8 | 30400
SINGLE GEARED
11 | 336 | 115 | 38600
20 | 672 | 108 | 71200
27 | 1008 | 104 | 103000
38 | 344 | 96.5 | 190000
WHEN A REHEATER IS USED THE WORK DONE BY WINCH IS FROM 12% TO 15% MORE
Fig. 7.

The calculations given, which are based on a pressure of 20 lbs., are not to be taken as an absolute recommendation, although the experiments made indicate that pressures lower even than these are actually found in practice to be used. They serve rather as a guide to the direction in which economy must be sought for in the installation of compressed air for auxiliaries, but naturally the selection of the proper pressure to use must depend in each case upon investigations based upon the requirements of the particular ship until further experience has been accumulated.

Air Reheating. The diagram in Fig. 7 gives the result of a series of experiments carried out at the author's works on a 3-ton winch, having cylinders 7 in. by 10 in., kindly supplied for the purpose of these trials by Messrs. Robt. Roger & Co., Ltd., of Stockton-on-Tees. The intention of these experiments was to ascertain the increased efficiency obtainable by heating the delivered air by means of the exhaust from an oil engine.

Fig. 8 shows the general appearance of the testing plant, consisting of a Reavell two-cylinder paraffin engine driving a Reavell quadruplex compressor. The exhaust gases from the engine were passed through the tubes of the reheater shown, while the body of the reheater was used as an air reservoir and from it the heated air was passed to the winch. The average figures obtained show that when working under conditions given on Fig. 7 with the Roger winch, the increased speed at which the winch operated with a fixed speed of the air compressor and oil engine varied from 12 per cent. to 15 per cent. When the air, however, was carried for a long distance and brought back to the winch, so as to imitate the conditions which would happen on the deck of a ship, most of this heat disappeared. The conclusion arrived at was that unless the air could be used immediately after leaving the reheater and without passing through a long range of pipes, the extra expenditure for reheating was not recouped. The provisions made by the author for testing the Roger winch included a derrick to represent the average height from the hold of a ship to overside, and provisions were made for lifting weights of varying amounts from 3 cwts. to 12 cwts., both in single and double gear. The results of these tests confirm the results already given earlier in this paper. The only criticism which can be fairly levelled at the low-pressure system is that the proportion of the total energy in the compressed air which is uselessly absorbed in friction in the deck winch is greater than when a high pressure is used. On the other hand, the leakages which at present are frequently observed in the working of ordinary deck machinery at the usual steam pressures carried, will be enormously reduced with a lower air pressure, and may be taken as a set-off against this loss. Moreover, it must be remembered that in ordinary deck winches no high steam economy is aimed at. The period of cut-off is very near the end of the stroke, and consequently there is scarcely any expansion.

Advantages of Low-Pressure Air System.—These conditions are ideal, however, for low pressure air, because if no expansion is attempted there can be no difficulties as to freezing in the exhaust, which is sometimes a difficulty when high-pressure air is used and expanded. All refinements as to re-heating are unnecessary with a low-pressure system. A single uncovered pipe is all that is necessary from the air reservoir to the deck winches. No return pipe is needed, and the winch can exhaust freely into the atmosphere, and undoubtedly thereby increase its efficiency slightly, as compared with the exhaust pipes discharging overside, which are familiar in ordinary cargo boats with steam winches. No difficulties as to condensation will occur, and the general formation of the winch so familiar to seamen and dock hands all over the world can be retained. The cost, therefore, of a pneumatic deck equipment on these lines may be expected to compare very favourably with any scheme of hydraulic or electric deck winches for Diesel-engined ships. Probably the only modifications which would be required to standard winches would be directed towards improving the efficiencies and reducing the leakage losses, and if the experience in constructing compressed air machinery is followed these modifications could be readily effected. The author would point out that in these investigations he has principally had in view the type of cargo boat in which the Diesel engine is at present being developed, and which would also probably be the type of boat selected for any experiments with suction gas in gas engines, for which, of conrse, this pneumatic system would be equally applicable.

The remainder of the auxiliary machinery in such boats could all be operated directly from the main engines, or could be worked by compressed air. A donkey pump or ballast pump, for example, as is well known in mining work, can be just as satisfactorily operated with air as with steam. When passenger boats, and cargo boats also carrying passengers, are considered, there is undoubtedly more to be said for the considerable use of electricity for auxiliaries, although the author believes that, if investigated on correct lines, compressed air will even in these cases be found to be a most useful, efficient and economical servant. The author claims, however, that for the class of ship which this paper principally deals with, the case for compressed air is an exceedingly strong one when approached on the principles he has ventured to lay down as the result of his investigations.

The engine room of a Diesel-engined cargo boat using compressed air for the winches, windlass, etc., would therefore be equipped as follows :—The compressor for supplying high-pressure air to the main engines would be made of just the size required for that purpose, without allowing margins for auxiliary purposes. The duplex steering system from levers on the engine would provide compressed air for steering ; and the usual pumps for ballast, water circulation, etc., would also be driven by these levers, or the scavenging pump

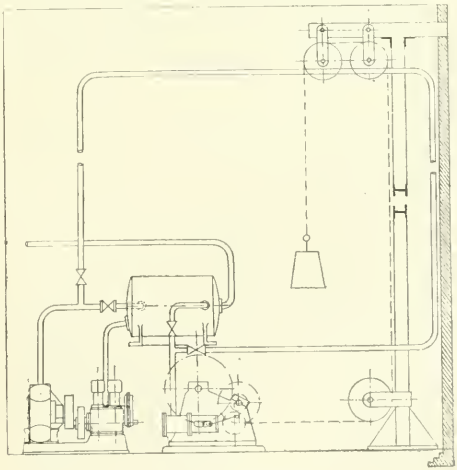


Fig. 8.—Arrangement of Testing Plant for ascertaining air consumption of Roger's Winch.

however the engine is of the two stroke cycle type. There would be an auxiliary Diesel or semi-Diesel engine, which would have compressors attached to each end of its crank-shaft. On the one end would be the high pressure auxiliary or manœuvring compressor, to be used when starting and also navigating the ship in crowded waters, so as to supplement the air supply from the main compressor when the engine is going dead slow or is stopped. The air from this compressor would also be used to increase the air available for steering purposes and the delivery from the compressor would be automatically controlled by pressure regulators, so that no attention would be required beyond lubrication. The other compressor would be of the low-pressure type for dealing with winches and windlasses; and the two compressors would be connected to the auxiliary engine by clutches or other simple and suitable means, so that when the ship is under way, the low-pressure compressor can be disengaged, and when the ship reaches port and is about to deal with her cargo, the high pressure auxiliary compressor can be disengaged and the low-pressure compressor connected up.

There would doubtless be other practical details to deal with (such as the heating of the officers' quarters, which could be dealt with by a hot-water circulating system instead of a steam system, the heat being obtained from the exhaust of the Diesel engine at sea and the auxiliary Diesel in dock), but the author ventures to think that on its broad lines a good case has been made out for the use of compressed air for auxiliary machinery.

FOREIGN NOTES.

Austria.

THE cargo steamer *Perla*, built to the order of the Steamship Co., Navigazione Libera Triestino, by the Cantiere Navale Triestino, was put through her trial runs, when she attained a speed of 12·3 knots. This steamer and the *Amba*, built by the same Company, will be equipped with improved machinery for handling cargo expeditiously.

U.S.A.

The Admiralty have obtained a grant of money for the construction of two battleships. A vessel is also to be built to be used for the docking and salving of submarines, and later on four others are to be provided for the Atlantic and Pacific Ocean. The construction of these vessels will be an adaptation of the Italian "Laurenti" type.

The three latest battleships, *Nevada*, *Oklahoma* and *Pennsylvania* are to be made unsinkable according to the system of Mr. Wotherspoon, which is based on the principle of using compressed air to empty the flooded compartments, and also for strengthening the bulkheads by filling the neighbouring compartments with compressed air of reduced pressure.

Denmark.

The motor vessel *Siam* has been launched at the shipyard of Messrs. Burmeister & Wain, where she has been built to the order of the East Asiatic Co. The *Siam* has a carrying capacity of 8,900 tons and is as yet the largest vessel built at this shipyard.

France.

The Chantiers de Bretagne have just launched two tug steamers built to the order of the Cie Universelle du Canal de Suez, for service in the Canal.

The Government intends to erect large works for the manufacture of armour plates to avoid paying the present prevailing high prices.

The mail steamer *Theodore Mante*, built at the La Seyne shipyard to the order of the Cie de Navigation Mixte, has just terminated successful trial runs with excellent results. She is to enter on service to Algeria in a very short time.

The Cie Marseillaise de Madagascar has acquired the cargo steamer *Malgache* of 2,000 tons. The *Malgache* is to be used for service to Madagascar, where the new owners have numerous trading depots.

The *Congo*, of 3,840 ton,, has just been sold by the Messageries Maritimes to Genoa to be broken up. The *Congo* was built in 1878 at the La Ciotat shipyard, and was sold for the price of 257,000 fcs.

The Cie Générale Transatlantique is now going to place a larger steamer, *L'Hermine*, on the Nantes-Algeria line in place of the *Fournel*. The *L'Hermine* was acquired at Trieste.

The mail steamer *La Savoie* was to undergo considerable alterations at the Penhoet shipyard, but as this yard has its shops full up with work, the *La Savoie* has been sent to Southampton, where the work will be carried out.

The British steamer *Mytlebank* has been purchased by the Cie Générale Transatlantique; after she has been refitted she is to be employed in the trade on the coast of Morocco.

Germany.

The cargo and passenger steamer *Phœnix*, built to the order of the Steamship Co. "Argo" at Bremen, has been successfully launched at the shipyard of the Stettin Oder werke. The *Phœnix* will be fitted up with all the latest appliances for rapidly dealing with cargo. The passengers are provided for in most commodious cabins, which afford every convenience during the voyage, including electric lighting and ventilation, and there will be ample boat accommodation for every one on board.

The cargo steamer *Rappenfels* has been put through her trial runs. She was built at the shipyard of the Bremen Vulkan Co., to the order of the Hansa German Steamship Co. at Bremen, who took her over on the completion of her trials. Her carrying capacity is 9,000 tons. She is specially fitted for service in the tropics with ice cooling compartments for provisions. A wireless plant is installed. The driving power consists of a triple-expansion engine of 3,000 i.h.p., and the speed of the vessel will be 12 knots.

The Hamburg Port Steamship Co., Ltd., has placed an order for three ferry steamers with the shipyard of Janssen and Schmilinsky. They will be the largest ferry steamers of the above company and have accommodation for 500 passengers and be fitted with engines of 300 i.h.p. each. They are to do service in connecting Hamburg with the other side of the river.

The shipyard of Blohm & Voss has received an order from the Austrian Admiralty for a floating dock of 40,000 tons lifting capacity, able to take in the largest ships.

The cargo steamer *Peter Rickmers*, built to the order of the Rickmers Steamship Co., at Hamburg, has just been launched at the Reismühlen shipyard at Bremerhaven-Geestemunde. The engines of 2,800 i.h.p. are provided by the Weser Engineering Works at Bremen. The steamer will have a speed of 12 knots and be fitted up with a wireless plant and submarine sounding apparatus. The *Peter Rickmers* will be ready for service at the commencement of April and will begin her voyage to America and other parts with general cargo. Her carrying capacity is 8,000 tons deadweight.

The passenger and cargo steamer *Sierra Cordoba*, built by the Stettin Vulcan Co., went through her trial runs very successfully and was at once taken over by the Norddeutscher Lloyd, the owners.

The British steamer *Mandasor* of 8,200 gross tonnage, built in 1902, has been acquired by the Hamburg-America Line, and was rechristened, being given the name of *Belzig*.

The cargo steamer *Skutari* has been sold to a shipping company at Genoa. A German shipping company has bought the Danish steamer *Danneburg*, which has been rechristened *Lexa Maersk*.

The leading shipping companies have had prosperons business in the past year, the Hamburg-America Line distributes a dividend of 10 per cent.,the German East Africa Line 8 per cent., the Kosmos Steamship Co. 14 per cent., the German Australian Steamship Co. 14 per cent., the German Levant Lines 7 per cent., whereas some shipbuilding establishments have not been able to gladden their shareholders with any dividends at all.

Institute of Metals.—The annual general meeting of this Institute was held on March 11th and 12th, when the report of the Council was submitted. The roll of membership is shown to be 614 at the end of December, 1912, as against 586 in 1911. A number of papers were read, including "The Corrosion of Aluminium," by Mr. G. H. Bailey, and "The Corrosion of Distilling Condenser Tubes" by Mr. Arnold Philip.

MECHANICAL GEARING FOR PROPULSION OF SHIPS.*

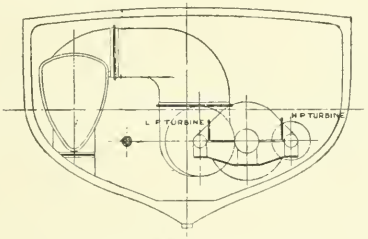
By the Hon. Sir Charles A. Parsons.

THE subject of the application of steam turbines with mechanical gearing to ship propulsion has already been brought before the notice of this Institution in papers read by the author in 1910 and 1911. These papers described the experimental installation in the cargo steamer *Vespasian*, the successful results obtained with which have since that time led to considerable development in this type of propulsion. It is the object of the present paper to give an account of the progress that has been made up to the present time.

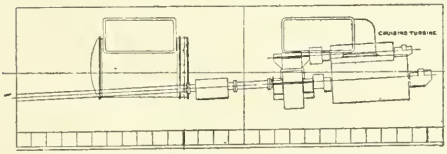
Geared turbine propulsion is in this country now well advanced beyond the experimental stage. There are already in actual service cargo steamers, Channel steamers, and warships, together representing a total of about 26,000 H.P. developed by steam turbines and transmitted through mechanical gearing, and there is at the present time under construction turbine machinery and mechanical gearing representing a transmission of over 120,000 H.P., including two installations of over 20,000 H.P. each.

Geared turbines have been fitted in two Channel steamers for the London and South-Western Railway Company's service between Southampton and Havre, the S.S. *Normannia* and S.S. *Hantonia*, of 1,900 tons displacement, having a shaft horse-power of 5,000 at a service speed of about 18 knots. These installations were fully described in a paper read before this Institution by Professor J. H. Biles in 1912. They continue to show an economy, as compared with other turbine steamers on the same service, of about 40 per cent.,

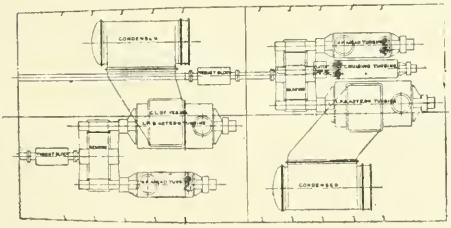
Fig 1.—Typical Installation of Geared Turbine Machinery for a Torpedo Boat Destroyer.



Section on AA. looking forward.



Elevation



Plan.

*Abstract of a paper read at the Spring Meetings of the Institution of Naval Architects, March 13th, 1913.

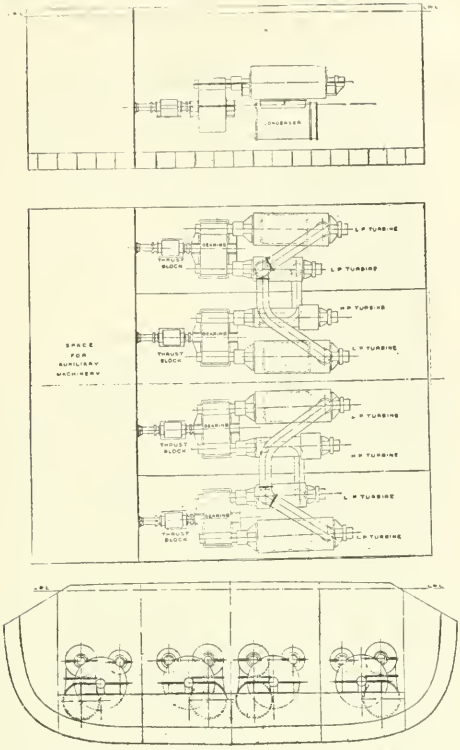


Fig. 2.—Typical Installation of Geared Turbine Machinery for a Battleship.

due partly to increased efficiency of turbines, partly to increased efficiency of propellers with the lower revolutions adopted, and partly to improved form of vessel incidental to the reduction in boilers and the adoption of twin screws. The *Normannia's* gearing has been recently inspected after steaming over 26,000 knots, and was found to be in perfect condition; no wear whatever can be detected.

Geared turbines have also been installed in three Channel steamers for the Indian Ferry Service between India and Ceylon, in accordance with designs and specifications prepared by Sir William White. The first of these, the S.S. *Curzon*, has successfully passed her speed trials and considerably exceeded the speed guarantee undertaken by the builders of the vessels and propelling machinery, Messrs. Inglis & Co., Glasgow. The reduction gear was made by the Parsons Marine Steam Turbine Company.

A cargo steamer built for the Cairn Line by Messrs. Doxford, Sunderland, has been recently fitted with an installation of geared turbines similar to that adopted in the *Vespasian*, consisting of two turbines, a high-pressure and a low-pressure turbine in series, capable of developing about 1,600 S.H.P., which is transmitted through mechanical gearing to a single propeller shaft at 63 revolutions per minute, the speed of the vessel being about 10½ knots. It is interesting to notice that a coal consumption trial has been made with this ship running side by side with a sister ship, the S.S. *Cairngowan*, with exactly similar boilers and propeller, but with triple-expansion reciprocating engines, the coal supplied being of the same quality and measured in the same way on both ships, and the geared turbine ship has shown a saving of 15 per cent. in the coal consumption.

So far no limit in regard to the surface speed of the teeth has been discerned, and there is no evidence of any limit to the power that can be transmitted by mechanical gearing with gear wheels suitably designed. It appears that this type of propulsion can be adopted with advantage in all classes of work, ranging from low speed cargo steamers to high-speed destroyers and battleships and liners of large powers, and there can be little doubt that it will be extensively employed for all classes of ships in the near future.

A few illustrations are given at the end of the paper of typical arrangements of geared turbine machinery. Fig. 1 shows an installation suitable for a destroyer of about 20,000 H.P., with twin screws at 430 revolutions per minute. It will be seen that the installation consists of a high pressure and a low-pressure turbine driving each shaft, and an additional cruising turbine geared with one of the shafts for employment at low speeds. Fig. 2 illustrates a design for a battleship of about 40,000 H.P., with four shafts at 200 revolutions per minute. In the arrangement illustrated there are two turbines geared to each shaft, the turbines on the two shafts on either side of the ship being arranged in the well-known 4-cylinder triple formation, each group consisting of a high-pressure, an intermediate-pressure, and two low-pressure turbines, an arrangement which leads to a high efficiency both at full power and at cruising speeds. Fig. 3 shows a further design for a battleship of about 60,000 S.H.P., with geared turbine machinery on four shafts, which also includes an additional set of small turbines and gearing for use when cruising. In such an arrangement the gear wheels of the cruising set would be connected to the propeller shafts through clutches, and the main gear wheels also clutch-connected, so that whichever set of machinery was in use the other set could be entirely disconnected from the propeller shafts, and all losses from idle running avoided. This separate cruising installation would have its own small condensing plant, or could make use of the small auxiliary condensing plant usually fitted. By this means the fuel consumption per shaft horse-power at the cruising speed can be made practically the same as that at full power. Fig. 4 shows an installation of geared turbine machinery suitable for a cruiser of about 30,000 H.P. on two shafts at 300 revolutions per minute. Fig. 5 shows an installation suitable for a large Atlantic liner of about 60,000 H.P. on four shafts at 200 revolutions per minute.

For the purpose of observing as closely as possible the practical requirements in regard to accuracy of cutting of gear wheel teeth, two gear-cutting machines were installed in the works of the Parsons Marine Steam Turbine Company in 1910. With these machines, which were built by Messrs William Muir & Co., Manchester, tooth faces are automatically generated by the process known as "hobbing." These two machines have, since they were installed, cut gear wheels representing a transmission of about 50,000 H.P., and the experience thus gained in this work has enabled several important improvements to be made to them.

Two similar machines were installed in the works of Messrs. C. A. Parsons & Co., Heaton, Newcastle-on-Tyne, for the manufacture of geared plant for the driving of electrical generators, rolling mills, works shafting, etc.

Examination of the teeth of gear wheels which have been running for some little time, transmitting large powers, shows the work to be distributed over the teeth with fair uniformity, and confirms the opinion expressed by the author before this Institution in 1910, in his reply to the discussion on the first of the papers above referred to, that with double helical gear such devices as floating frames for the pinions or hydraulic pistons to distribute the load equally over the pinion bearings are totally unnecessary, the natural elasticity of the supporting structures providing all the accommodation necessary, assuming, of course, reasonably accurate alignment of the shafts. The pinions are in all cases connected to their turbine shafts by flexible couplings, which allow them longitudinal freedom, and this in itself, with double helical gears, ensures that the load is practically equally divided between the right and left-hand portions of the gear.

Careful investigations have been made of the causes producing noise, with the object of removing such causes and obtaining a silent gear. These investigations show the noise to be due to slight inaccuracies in the teeth, the order of accuracy required for silent gearing being higher than present gear-cutting machines are capable of affording. In the course of the investigations a microphone oscillograph record was obtained from a double helical gear wheel by suspending over the gear case a microphone connected with an oscillograph. Definite notes were produced, the frequency of which was found to be 160 times the number of revolutions of the wheel, and its source was traced to the parent gear of the gear-cutting machine, viz., the single worm and the 160 teeth of the worm wheel which rotated the table on which the work was mounted while the wheel was being cut. The inaccuracies of this gear were carefully measured, and found to be co-periodic with the worm wheel teeth, and to have a double amplitude of about four-thousandths of an inch. The remainder of the paper deals with means for avoiding these irregularities.

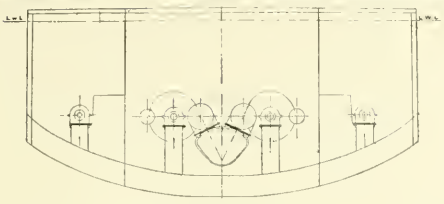
INSTITUTE OF MARINE ENGINEERS.

THE twenty-fourth annual meeting of the Institute of Marine Engineers was held on Friday, March 7th, at the Liverpool Street Hotel, London, E.C., the retiring president, Mr. Summers Hunter, being in the chair. The following extracts from the report submitted by the Hon. Secretary at the meeting, are given for the information of our readers.

Titanic Engineers' Memorial.—This fund amounted to £2,603 at the close of the financial year. Since then it has increased week by week, and is still open for contributions. A large number of members closely associated with Southampton, and desirous of having a memorial erected on a suitable site at that port, subscribed to a fund specially collected for that purpose, while many also contributed to the Institute fund with a view to assist in the erection of a memorial with which the Institute should be associated. Thus a sympathetic association has been maintained with the committee at Southampton to mutual advantage and in harmony with the views of many subscribers. The main object of the memorial, however, is to establish a means to assist, where and as required, the widows of marine engineers in bringing up their children, and possibly form the nucleus of a fund which may be subscribed to annually—as has been suggested by some members, with a view to maintain a school or home. Other suggestions have also been placed before the committee for consideration on similar lines and will receive due attention.

New Premises.—The purchase of a site on which to erect new premises marks an important epoch in the history of the Institute—now approaching the twenty-fifth year since its foundation was laid. It is a matter of regret that the first president, Mr. Asplan Beldam, had not lived to see this accomplishment. It is anticipated that with the addition of central premises there will be a large influx of new members and considerable developments in the work of the Institute, both on the educational and the social sides.

City Premises Fund.—This fund has made considerable progress since the last report was given. It now amounts (including promises) to a total of £5,952 3s., of which £5,633 14s. 6d. has been received and paid into the bank, leaving a balance of £318 8s. 6d. not yet to hand. The interest on deposit account amounts to £93 6s. 4d., thus bringing up the total to £6,045 9s. 4d. The committee, however, wish to point out that the sum subscribed falls a long way behind what is required to complete our task, and would earnestly impress upon all members to



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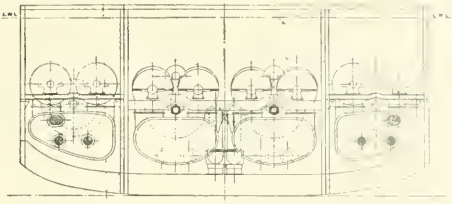

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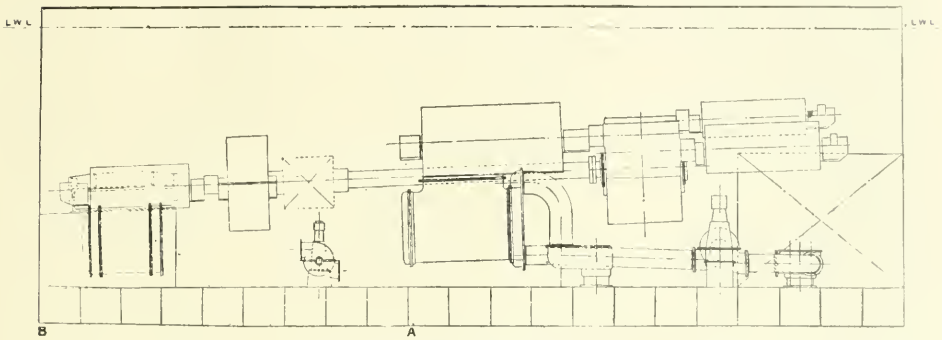


ELEVATION CENTRE SHAFT

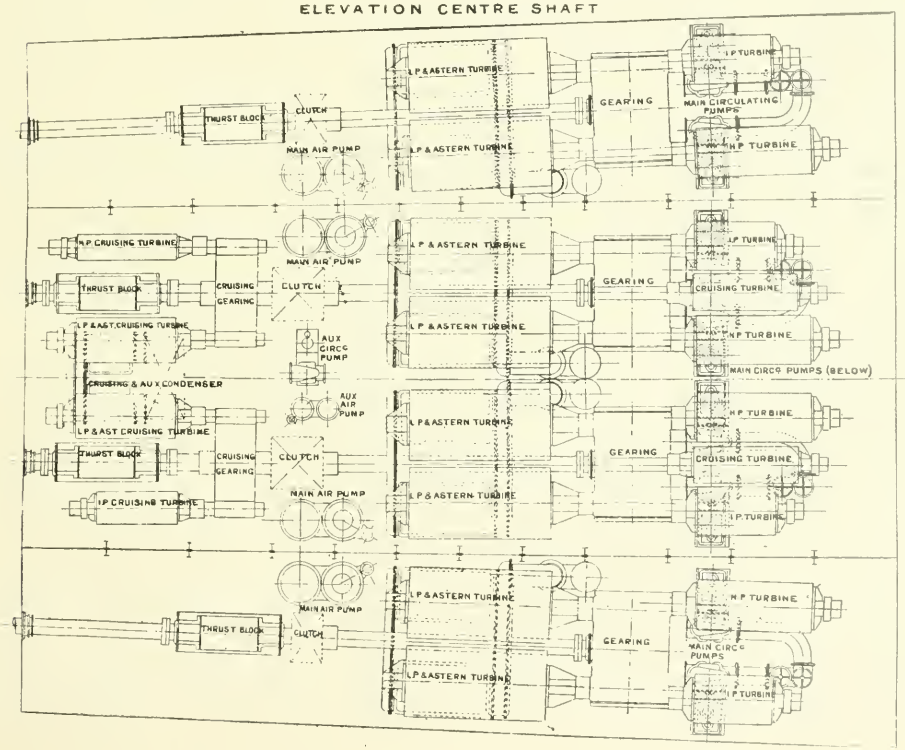


Fig. 3.—Geared Turbine Machinery for Battleship with separate Cruising Installation. (See page 337).

make a special effort in the direction of sending in subscriptions from themselves and friends, so that, when the new premises are erected, the committee may not only be in a position to pay for the buildings, but have a handsome balance towards liquidating the increased cost of their maintenance. The negotiations for the acquirement of the site on Tower Hill are now completed, and the necessary documents are in course of preparation.

Marine Engineering Conditions.—The changes which have been taking place in many of the relationships of life are exercising the minds of engineers in directions which may render it desirable for the Institute to exert its influence regarding questions of importance in connection with improvements in marine engineering conditions. The unsatisfactory position of the R.N.R. engineer is one of the questions which has been discussed by members, and, incidentally, the stoker-mechanician and his duties. There are several other questions which arise under the subjects brought before, and discussed by, the Advisory Committee of the Board of Trade which call for careful consideration.

Membership.—A nett increase in the membership of 66 is recorded, bringing the total number on the roll up to 1,350.

Papers and Discussions.—Nine papers have been read and discussed during the session, and one lecture given, most of the meetings being held on Monday evenings at eight. A suggestion has been made to alter the evening of meeting, for the convenience of some members who are otherwise engaged on Monday, and on this point comments are invited.

Issue of Transactions.—The Transactions for session 1912-13 have embraced most subjects of interest in present-day engineering, and have created so much interest beyond the membership that many engineers have been led to apply for admission; especially in outlying districts and abroad is the value of papers on modern subjects appreciated, and excellent testimony from members resident in different parts of the world as to the policy—which has done much to make the value of the Institute better known in all parts of the world—of maintaining the monthly issue, has been given by several correspondents. The issue of Transactions in the session under notice is one of the largest since the founding of the Institute, including the *Titanic* memorial number, which was well received, and its wide distribution has no doubt materially assisted the fund being raised. Members in out-ports or abroad are invited to send contributions commenting on the papers read, or dealing with personal experiences of general interest, as all such tend to increase the value of papers read.

Advisory Committee, Board of Trade.—The principal subjects discussed by the Merchants' Shipping Advisory Committee of the Board of Trade from November, 1911, to January, 1913, have been:—"Watertight bulkheads of steamships, their number and height;" "Lifeboats, their construction and the number to be carried, also the manning of them;" "Compulsory boat drill;" "Life-saving appliances;" "Wireless telegraphy and the number of engineers and mates to be carried on various classes of steamships." The Institute is represented on the committee by Mr. Geo. Shearer (member).

Annual Dinner.—The annual dinner was held on November 8th, 1912. It was a very successful gathering, and has been previously reported in these pages. The gathering for the junior section on the last night of the year was an excellent one, and the assembled company spent a very pleasant evening. On the stroke of midnight a message conveying the good wishes of the president was announced, and a return message despatched to Mr. Hunter.

Experimental Department.—Several fuel tests for heating values have been carried out during the past session. This department is always prepared to accede to the wishes of members in carrying out such tests, both on the dates given on the syllabus and also to suit the convenience of those interested, on other evenings by arrangement. It is possible by the co-operation of the members to greatly extend the usefulness of this department. Certain classes of fuels from various districts have their own peculiarities in burning, and while the heating power is a guide as to the value of the fuel, the real test is its behaviour in the furnace. In addition to samples for heating values, the department would be pleased to have reports as to the characteristics of the fuel in raising and maintaining steam, in order that such should be noted in the record book for general information.

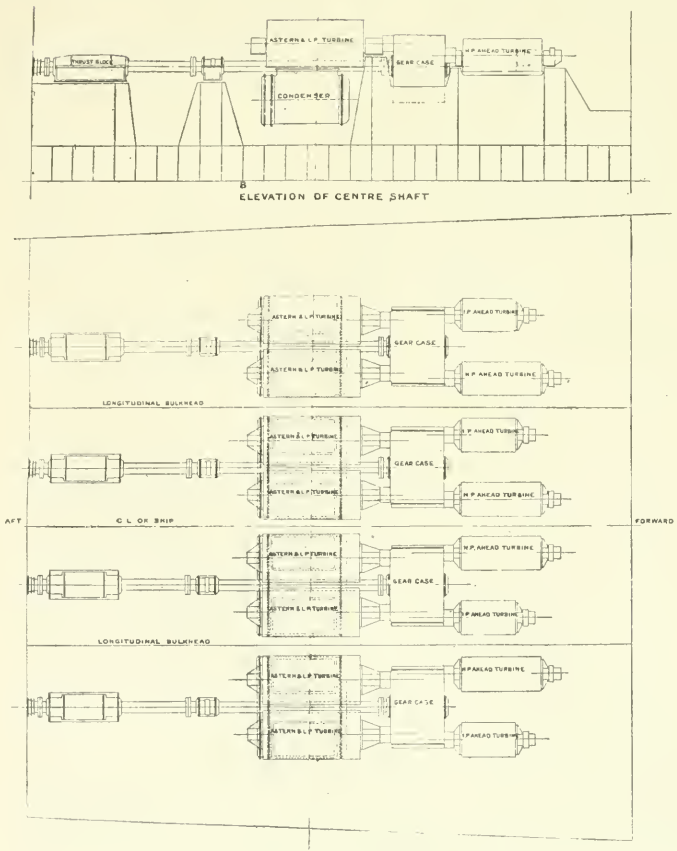
Office Bearers.—Mr. Thomas L. Devitt was unanimously elected president for session 1913-14, Mr. Jas. Adamson, hon. secretary, and Mr. Alex. H. Mather, hon. treasurer. Five members of the council retired by rotation, and the following were elected to fill the vacancies: Messrs. Geo. Adams, Robt. Balfour, E. W. Green, J. G. Hawthorn and J. A. Mannell.

An Exhibition will be held in Bristol from May to October, 1914. It will be called The Bristol International Exhibition, and has a number of influential people as patrons. There will be pavilions for machinery, electricity, the navy and mercantile marine, etc. The offices are at Centre Chambers, Bristol.

New Motor Showrooms.—Messrs. James Pollock, Sons and Co., Ltd., of 3, Lloyd's Avenue, London, E.C., have arranged to have at their offices a spacious showroom, and for this purpose they are now reconstructing the whole of the interior of the top floor of their offices. In addition to several sizes of marine motors, there will be models of electric lighting and pumping sets, propellers, ships models, etc., etc.

Shipwrights Company.—An adjourned special court of the above company was held on March 4th at the offices of Messrs. Harland & Wolff, Cockspur Street, S.W. (by kind permission of Lord Pirrie, past master), the Master (Mr. J Bell White) presiding. He was supported by Colonel Sir William Dunn, Sir Philip Watts, K.C.B., F.R.S., Lord Allerton, F.R.S. (wardens), the Master-elect (Sir Edward Clarke) being prevented from attending by ill-health. There were also present the following members of the Court—Sir Joseph Savory, Bart., Deputy J. Last Sayer, C.C., and Messrs. Clement Godson, M.D., V.D., T. L. Devitt, A. J. Fells, Charles E. Ellis, H. H. J. W. Drummond, H. W. S. Baden-Powell, K.C., Colonel T. Davies Sewell (hon. treasurer) and the acting clerk, Mr. H. W. Sewell. The resignation of Mr. Wynne E. Baxter, clerk to the company for over thirty years, was accepted, and a resolution was unanimously passed conveying the cordial thanks of the Court to him for his past services to the Company, and expressing satisfaction that his long association with the company would still be maintained in the office of honorary solicitor to the Company. Mr. Arthur D. Hansell, solicitor, of 14, Gray's Inn Square, W.C., was unanimously elected to the vacant post of clerk to the Company. A cordial vote of thanks was accorded to Lord Pirrie for his kindness in granting the use of the Board-room for the meeting of the Court.

Fig 5 Typical Installation of Geared Turbine Machinery for a large Atlantic Liner



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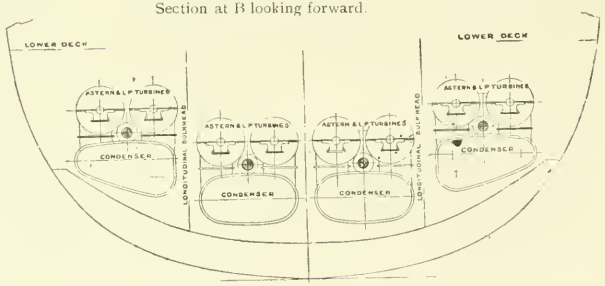
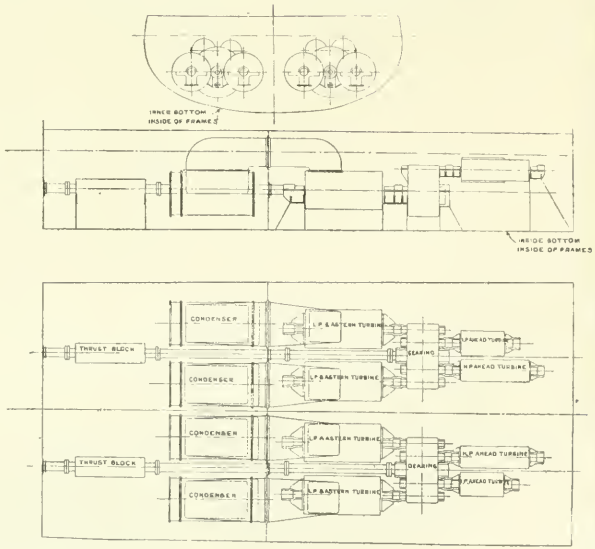


Fig. 4.—Typical Installation of Geared Turbine Machinery for a Cruiser.



Mechanical Gearing for Propulsion of Ships (see page 337)

THE FLEETS OF THE MAIL LINES.

(From our own Correspondent.)

The P. and O. Company.

THE P. & O. Company seem to have, at any rate temporarily, placed their steamship *Caledonia* in the public yachting business in place of the *Vectis*, recently sold out of the fleet. At all events this vessel is appointed to make three cruises during the next few months. The first, which commences on the 25th April, will be to various Mediterranean ports; the second, which is to begin exactly four weeks later, will be to Madeira and the Azores; and on the third expedition she will leave London for the Norwegian Fiords on the 19th June, calling *en route* at Leith. This vessel has a number of single-berth cabins, and, as befits a vessel usually employed in the Indian Mail service, she has a Marconi installation. The *Caledonia* is considerably larger than the old *Vectis*, being of 7,572 tons gross register. Like her predecessor she was built on the Clyde by Messrs. Caird. She dates from 1804.

The Dover-Ostend Service.

The Belgian Government has already three turbine-engined steamships of somewhere about 24 knots speed employed on this service, and for some time it has been known that two additional vessels were being constructed for its further development at Hoboken by the Cockerill Company. The first of these vessels, which is now named the *Stad Antwerpen*, was put in the water on the 4th March and the second will follow in due course. To her has now been assigned the name of *Ville de Liége*. It may be interesting to note that whilst on the stocks other names were allotted to these vessels. There will be three shafts driving three propellers and the steam to the turbines will be supplied by an installation of Babcock and Willcox water tube boilers. Special attention has been paid to the sub-division of these ships, whose bulkheads are fitted with doors on the Stone-Lloyd principle, and the provision of life-boats will be in excess of what is demanded by the new British rules. In addition there will be wireless installations, the Belgian Government having been one of the first steamship owners to adopt the principle. Probably the advent of these fine steamers will encourage the Minister who is charged with the management of the line to dispense with some of the older paddle boats whose services can hardly be required even in case of repair or breakdown, and whose presence in the fleet always tends to make passengers suspicious that they may have the ill luck to find the sailing in which they are particularly interested taken by a substitute.

Disasters.

There have been one or two notable shipwrecks to be recorded. Amongst them was the loss of the Cardiff steamship *Alum Chine* when loading dynamite from lighters at Baltimore on the 7th March. Fire seems to have broken out in the vessel's hold from some cause which as yet has not been ascertained, and there was naturally a general stampede, for not only was there a large amount of the explosive actually in the hold, but the lighter alongside carried four railway trucks with a total of somewhere about 340 tons. If we remember rightly the famous explosion on the steamship *Chatham* only involved something under a hundred tons of the stuff, and thus the effect of what happened on the *Alum Chine* must have been terrific. Those who fled from the doomed vessel got on to a launch lying alongside and are said to have proceeded not more than 200 ft. when the shock came. Three persons were reported killed aboard the steam-tug *Atlantic*, lying some distance away and the United States Government-collier *Jason*, also in the vicinity, sustained serious damage to her upper works, boats and deck houses. These damages were caused by the fall of heavy masses of wreckage and even, it is said, by the dropping of as yet undischarged boxes of dynamite on the vessels' decks. Débris was also dropped three or four miles away in Baltimore itself, the city being shaken as if by an earthquake. It is alleged that the shock was noticeable over a radius of a hundred miles. The *Jason*, which is a large vessel insured for some £200,000, was on her trial trip at the time. The *Alum Chine* and the lighter have of course disappeared. It seems a strange and providential thing that quite an appreciable interval, placed as high as twenty minutes by some of the survivors, elapsed between the first alarm and the actual explosion. Thus some fifteen of the ship's company escaped. Besides those killed a large number of persons were injured, many of them very seriously.

Another most serious accident, from the underwriter's point of view at least, has been the fire on board the New Zealand Shipping Company's twin-screw liner *Turakina*, homeward bound from New Zealand to London. When at Rio de Janeiro fire was discovered in her cross bunker. It spread to the holds and eventually the ship had to be beached and flooded throughout. Thus the valuable cargo which she carried was practically destroyed. She had on board nearly ten thousand bales of wool—a commodity which will probably prove to have stood the experience better than most of the other goods; 1,140 tons of butter; over 1,000 tons of cheese, and 34,000 carcases of mutton. The total value of the cargo is put down at half a million sterling, whilst the vessel herself, which is of upwards of 7,000 tons and of course fitted with luxurious passenger accommodation and a large refrigerating installation, is valued for insurance purposes at £112,000. When the fire was got under control great trouble was experienced in the hot climate of Rio with the water-damaged and rotting cargo. At one time it was thought that it would be impossible, at least commercially, to get the stuff out of the ship on account of the stench, and the suggestion was actually made that the vessel might have to be towed out to sea and scuttled. So bad was the smell that after the passengers had been sent on their way by other conveyance the crew was landed, and discharge commenced by shore labour. Though no injury to life or limb seems to have occurred the casualty will prove a very costly one.

The Isle of Man Steam Packet Company

has had a valuable addition to its fleet by the launch of the turbine driven *King Orry* from the yard of Messrs. Cammell, Laird & Co., of Birkenhead. This vessel is the third of her name, the first *King Orry* of the line having been built at Douglas, Isle of Man, in 1842, whilst the second came out in the year 1871. The last-named has only recently been cast from the fleet. Both these older vessels were of the paddle type. The speed of the new vessel is to be about 21 knots, which should make her a three hours' boat. It is interesting to observe that in his speech at the annual meeting of the Isle of Man Steam Packet Company the chairman commented on the effect upon the Company of the new Board of Trade rules. They would cost the Company about £5,000 to carry out—a sum which had been provided by the establishment of a new reserve fund, taken from the exceptional profits of the last year's working. It would now be necessary on all their vessels to carry buoyancy for 80 per cent. of the number of persons they were certified to carry in their vessels. Such buoyancy must consist of the accommodation in the boats (all of which now must be life-boats, life-rafts and buoyant seating). In addition to this provision there is an obligation that on night passages there must be buoyancy for all carried. Though there will be practically no difficulty in fulfilling these obligations it may be that the new rule will sometimes involve the despatch at night of two steamers where a single vessel has formerly been able to carry all passengers requiring accommodation.

The Royal Mail Steam Packet Company

has made two important moves during the last few days. First of all it announced that its steamship *Arlanza*, with the new vessel *Andes*, which is to commence her work in September, will be employed on an express service to the River Plate reducing the time of passage to eighteen days. That is to say they will reach Buenos Ayres on Tuesdays instead of as at present, on Saturdays. One means for effecting this great acceleration will be the omission of the calls at Pernambuco, Bahia, Santos and Monte Video. This step should do a good deal to meet the competition of foreign passenger lines in this important route. The other step made by the Royal Mail has been even more important. It has been the purchase of the two fleets of Nelson steamships. The new acquisition consists of the ten modern steamships of the Nelson Steam Navigation Company. These vessels are fitted with refrigerating installations and also with good passenger accommodation. Their speed is up to 14½ knots. The other fleet comprises nine vessels owned by the Nelson

Line (Liverpool) Limited. These steamers, though older, are also engaged in the same trade. The Navigation Company's steamers are of over 7,000 tons each, but none of those of the Liverpool Company exceed 6,000 tons, and run in some cases a good deal smaller.

The Nelson Company, which is now absorbed, was established in the year 1889. After eight years' experience its managers came to the conclusion that the dead meat trade from Argentine was likely to be more remunerative than the attempt to transport live cattle, and its fleet was accordingly designed to carry out that principle. Then three years ago the determination to enter the passenger trade was reached. The ten vessels of the Navigation Company—vessels which make the run to Monte Video in three weeks—were provided and put on the station, and in the comparatively short time that they have been at work they have achieved a considerable measure of popularity with passengers of all three classes. Being all new, they are all up to date, and not only have the advantages of speed, but have comfortable accommodation and installations of wireless telegraphy.

Speaking of

Wireless,

the "Times" stated at the beginning of March that a Mr. Panizzi Preston had called their attention to the condition of affairs in relation to the station at Aden. At 6 p.m. one evening in February he handed a message to the operator aboard the Nord Deutscher Lloyd steamship *Friedrich der Grosse* for transmission to England. After accepting the message, the operator reported that it could not be despatched till six o'clock the next morning, as the wireless office at Aden is closed between 6 p.m. and 6 a.m. This statement, so far as has yet appeared, has gone uncontradicted.

A Bottle Story.

In December, 1904, the steamship *Nutfield* left Mobile for Havre and not being heard of again, was in due course posted as missing. At the end of February it was reported that a bottle had been found near Rochester with a message from two of the *Nutfield's* firemen to the effect that on the 16th December, 1904, their vessel was sinking in the Channel. It was said that the authenticity of the message was vouched by relatives, who recognised the handwriting of the message. The owners have, however, pointed out that the story must be a hoax, as at the date named the vessel could not have got more than 800 miles on her voyage towards Europe.

Australian Regulations.

That rats are dangerous carriers of disease is now well recognised, but at the same time it seems a little extraordinary to read that the Australian Government will enforce a regulation that wire screens must be affixed to all openings in ships' sides on the landward side as they lie at Commonwealth wharves and that similar wire guards must be placed on all ropes so as to prevent rats coming ashore along them. Failure to carry out this provision effectively will be severely punished by the authorities.

The Balkan War.

It has been reported that another valuable steamship of the Greek mercantile marine has been sunk by the Turkish warship *Hamdieyh*. This was the *Themistocles*. But the report was soon contradicted and it is to be hoped that the story is untrue. But there is great difficulty in obtaining reliable news from the neighbourhood of the seat of war. Even in relation to the loss of the *Calvados*, a small passenger steamship trading locally under the British flag in the Sea of Marmora there were many conflicting stories. First of all it was said that she had foundered with all hands. Then it was said that the boatswain had escaped. Finally a Naval Court sat to enquire into the circumstances attending the loss. It then appeared that the vessel had struck the rocks off the island of St. Andre, when a panic ensued amongst the 200 passengers whom she carried. Some jumped, and some were swept overboard. But the major part of the passengers were saved by the heroism of the boatswain who swam ashore with a line. Still severe sufferings were endured by those who reached the rocks and seven of the passengers are said to have been frozen to death. The lives of all the crew, however, are said to have been saved.

The Donaldson Line,

which for some years has been engaged in the passenger and cargo trade between Glasgow and the St. Lawrence, has now registered itself under the limited liability Acts. The shares will not apparently be offered to the public, but the whole of the vessels managed by Messrs. Donaldson Bros., now spread over a number of ownerships—some owned by a private firm and some registered in the names of single ship companies—will now be brought into the one ownership. The fleet comprises a dozen vessels, of which the more modern are large and comfortable passenger steamships of a high class. The step may be taken as another indication of the progress of the Canadian shipping trade.

VICKERS' EXPERIMENTAL TANK.

WITH a thorough belief in the value of the experimental tank in modern shipbuilding practice Messrs. Vickers, Ltd., Barrow-in-Furness, have just completed the laying down of an experimental tank at St. Albans, near London, which in respect of site and construction, general arrangement and equipment, is of the most approved character from the point of view of obtaining experimental results on the "Froude" principle. For cutting the models, which are made of paraffin wax, to accurate shape from the rough cast, a special model-shaping machine is installed, which has been constructed and fitted by Messrs. Munro and Sons, London, who have already supplied corresponding equipment to a number of other "Froude" tanks. An overhead travelling hand-worked crane serves the workshop section for about 120 feet of its length, and by its means the models to be experimented with, usually from 15 to 20 feet in length, are conveyed from the casting chests to the shaping machine, and from the latter to the inner end of the tank. Here is situated the trimming tank, a recess of about 25 feet in length, where the models are loaded with ballast according to the amount and disposition required for the experiment. The model properly trimmed is taken in charge from this point by the model truck, which was constructed and fully equipped before re-erection at St. Albans, in the works of the well-known model making firm of Kelso & Co., Pollokshaws Road, Glasgow, by whom the corresponding apparatus in most of the other "Froude" tanks in this country and abroad have been supplied, including that at Clydebank, at Spezzia, at St. Petersburg and at Tokio, Japan.

The carriage, which is 30 ft. in length by 21 ft. 6 ins. span, and carries all the electric and magnetic fitments for recording the diagrams taken in the course of progress to and fro along the tank, runs on four main wheels, one at each corner with electric brake, two smaller wheels in addition, supporting it about mid-length. It is driven by two 12-h.p. electric motors, the current for which is supplied from a charging dynamo and battery of storage cells of the "Tudor" type. It thus takes power quite independently of current required for other driving purposes, such as wood-working machines, model-shaping machines, etc.; and for lighting, which current is taken from a public electricity supply.

Irrespective of the trimming extension at the inner end, the Vickers' tank has a clear length for experimental purposes of close on 380 ft., this being slightly less than in the National Tank at Teddington. The depth, however, is greater, being 13 ft. instead of 12 ft. 3 in. and there is a clear width of 20 ft. 10 in.

In the "Vickers'" tank the observation platform is considerably below the ledge of the tank and outside the basin proper. By this means an observer of ordinary height can traverse the tank on either side for the whole length, with head and shoulders just above the carriage rails, and with his eyes in convenient line for closely observing trim, wave formation, and other phenomena of the experiment.

WE HEAR THAT the White Star Line have just decided to fit their Australian fleet, and probably several other of their vessels, with the new hydraulic underline Ash expeller, which has recently been introduced by Messrs. J. Stone & Co., Ltd., of Deptford, and which has given such eminently satisfactory results in those vessels in which it has so far been installed; in fact, we believe the orders for the necessary machines have already been placed. It, therefore, appears that the two premier Atlantic lines (this expeller is already fitted, or being fitted, in the *Aquitania*, *Mauretania* and *Lusitania*) have been quick to appreciate the value of this machine—the only under-water line ejector on the market.

The Story of the Pacific Line.

REMARKABLE as was the daring of the management of the P & O Company in undertaking the working of a steamship service east of Suez in the early forties, their confidence in themselves and in the future of steam navigation was probably surpassed by the pluck of those who founded the Pacific Steam Navigation Company. For the P & O had had several years experience when they entered on the extension of their operations, and had acquired some practical knowledge of the working of the steam shipowners' business in foreign trade, whilst the Pacific Steam Navigation Company was inaugurated to commence operations forthwith in the most distant seas. It was in the year 1840 that the founders of the P S N. Co. obtained their charter and organized the Company with its headquarters in London and its capital a quarter of a million in £50 shares. At first but a small proportion of the capital was called up, though it was fully subscribed, and two small steamers were built on the Thames for despatch to the Pacific. Messrs. Curling & Young, of Limehouse were the builders of these two vessels, the *Peru* and the *Chile*, and their machinery was constructed by a then well known London firm Messrs. Miller & Ravenhill—whose engines were found in many paddle steamships down to a much later date. The two pioneer vessels were not intended to maintain communication between England and South America, for the Company's primary object was to work locally down the ports of the Pacific slope, and accordingly when the ships were completed they left the Thames in company in July, 1840, just about the time that the first of the Cunard mail steamers was beginning her task of maintaining a constant service between the Mersey and United States ports.

The difficulties and dangers of such a trade as that in which these two vessels now embarked will be recognised by all having experience of steamship management. There was immense difficulty in getting fuel, and the cost of what was obtained was so great as to make it almost impossible to make a commercial success of the adventure. For in those days the cost of coal, even under favourable circumstances, took a far larger proportion of the gross receipts of a steamship company than it does in these days of triple and quadruple-expansion engines and the many auxiliaries which economise the consumption of the steamship. Moreover, there were the dangers of these continuous voyages along a coast of whose soundings little was known, and of whose harbours no development had as yet taken place. So it is hardly surprising to learn that one of the two pioneer ships was lost but a short time after her arrival at the scene of her activities. As time went on and the difficulties in their path were fought the directors had gradually to call up the balance of their capital to meet the losses they had sustained. But they were by no means discouraged and in 1846 they despatched from the Mersey—to which port they had by this time transferred their headquarters—a new steamship of slightly smaller tonnage than her predecessors and still of the wooden paddle type. Another vessel was despatched at the end of the same year, and in 1849 we find the first iron steamship of the Company being launched on the Clyde by the famous firm of Messrs. Robert Napier & Sons. This was a vessel which at a later stage of her career showed the excellence of her design and the faithful work which her builders had put into her fabric by remaining afloat and getting into safety after a serious encounter with a rock.

The original service maintained by the Company had involved merely a monthly despatch each way between Valparaiso and Panama, where the steamers connected with those of the Royal Mail Steam Packet Co., plying from England to the Atlantic side of the Isthmus. The addition of the four new steamers which were added in 1852 enabled the Company to fulfil its new contract with the British Government for a fortnightly in place of the old monthly service. In 1856 the whole undertaking was re-organized by Mr. William Just, its then manager, who had indeed a great

Pacific Line Paddle wheel Steamers *Chile* and *Peru*, built 1840, length 198 ft., breadth 50 ft., 700 tons, 150 h.p. (The service between Panama and Valparaiso was commenced in 1840 with these vessels).

Lima and *Quito*, built 1852, 1,125 tons, 450 h.p.

hand in the direction of its fortunes for a full half century and who in the year we mention went out to the Pacific for the purpose of overhauling the business. It was in this year that the Company obtained from Messrs. Randoph Elder and Co. the first steamship fitted with engines on the compound system, having three years earlier adopted the screw form of propulsion for one of their vessels It was, of course, the high cost of fuel which induced the management to seek for any possible means of reducing consumption, and it was thus the Company's troubles from that cause, coupled with the sagacity and determination of its managers, which induced them thus early to adopt a form of engine which did not find its way into common use amongst shipowners till something like fifteen years later, and which proved the first step in that development which in subsequent years carried the marine engineer on to the elaboration of the triple- and quadruple-expansion engines with their further economies of fuel.

In the year 1865 a supplementary charter was obtained to enable the Company to extend its activities so as to allow it to establish communication "between the West Coast of South America and the River Plate, including the Falkland Islands, and such other ports or places in North and South America, and other foreign ports as the said Company shall deem expedient." This extension of the charter enabled the Company in December, 1867, to make the greatest step which it has as yet undertaken. Increasing its capital to two millions sterling, it ordered five new steamships of considerable size to enable it to start and to maintain a monthly service from Liverpool by way of the Peninsula to Valparaiso through the Straits of Magellan. Whilst the new liners were in process of building and preparation for service, the iron paddle steamer *Santiago* of 1,619 tons gross register, with a length of 267 ft. and a beam of 40 ft. 2 in., built in 1865, and her sister ship the *Pacific* maintained a temporary service, though these vessels had been built for and previously employed on the Pacific coast line.

Britannia, built 1872, 4105 tons, 600 h.p.

The five new vessels now built were magnificent steamships for that day, being :—

Steamer	Built	Tonnage nett	Tonnage gross.	Dimensions. Ft. in	Ft. in	Ft in.
Magellan	1869	1 791	2,856	352 6	41 0	18 0
Patagonia	1869	1 798	2,867	353 0	41 0	18 0
Iuna [illegible]	1869	1,807	2 877	354 8	41 0	18 0
Cordillera	1869	1,791	2,860	353 0	41 0	18 0
John Elder	1870	2,431	3,832	381 9	41 5	19 5

Trade was booming at this period in South America and the step seemed abundantly justified. So in 1870, the vessels coming from Liverpool, instead of stopping at Valparaiso, were sent on to Callao, which was now made the terminus of this service. Further it was soon seen that the sailings might be increased. First of all it was intended to make the despatches thrice a month. But even bolder counsels prevailed and eventually weekly sailings over the 11,000 mile route between Liverpool and Callao were decided upon. This resolution, of course, necessitated further capital, and the amount was now raised to three millions. Additional and larger vessels were thereupon ordered for the main line. These included upwards of a dozen vessels mostly built on the Clyde by John Elder & Co., of a tonnage approximately to 4,000 tons gross register apiece. In pursuance of the new contracts which were now obtained from the British and Chilian Governments a sailing was made at the beginning of January, 1873, by the steamship *Sorata*, the intermediate calls being at Bordeaux, certain Spanish ports, Lisbon, Rio de Janeiro, Monte Video and Punta Arenas. The vessels thus built were amongst the most remarkable of their time, Thus the *Iberia*, built in 1873, was of 4,671 tons gross register, her length being 433 ft. 5 in. and her beam 45 ft. She was said at the time of her launch to be the biggest vessel afloat, save always, of course, at that date the *Great Eastern*. She just surpassed the tonnage of the greatest Guion liner of the day, which in her turn was bigger than any other vessel in the New York trade. In 1874 the fleet aggregated no less than fifty-four vessels of 120,000 tons and 110,000 h.p. This, of course, was long before the days of big combinations and, if not actually the largest, was certainly the finest and most modern fleet of that day. But the inevitable reaction in the South American trade came, and the fleet of the Pacific Company was found too big for its requirements. The main line sailings were cut down to once a fortnight, and occupation had to be found for a good many first-class vessels. Some were sold out of the service, and of these a couple at least went to the Royal Mail Company's fleet. But another sphere of activity suggested itself, when the Orient Line was started to run on the Australian route in opposition to the P. & O. Company. The Pacific Company joined in the new adventure and provided the first tonnage for it.

The initial voyage of the new line was performed by the P.S.N. Co.'s s.s. *Lusitania* in 1877, and thereafter other ships of the Company maintained the service altogether, till the advent of the steamship *Orient* in 1880, and of the *Austral* in 1881 brought the first of the Orient Company's own steamers on to the scene. Eventually after one or two of the P.S.N. vessels had been purchased by the Orient Company, and others had been specially built by them, it was arranged that alternate sailings on the Australian route were taken by the ships of the partner companies, and this arrangement was continued for more than twenty years. Then came a time when the recrudescence of prosperity in South America became so marked that the managers of the Pacific Company felt that they had quite enough to absorb all their energies in the South American trade and so they disposed of their share in the Orient-Pacific business with the vessels which they had appropriated to its work to the Royal Mail Company, who stood in their shoes and ran their share of the sailings till the new mail contract with the Australian Government came into force, when they too dropped out and left the Orient Company unaided to bear the burden of the sailings and to take the full profit that was to be made from the work. But to return to the Pacific trade. When the surplus tonnage had been either put to other purposes or sold, a time came when the advent of the triple-expansion engine and the general development of the best type of passenger ship rendered new acquisitions desirable. So at the end of the eighties we find the Company ordering such vessels as the *Oruba* of 5,971 tons from the Naval Construction and Armaments Co., of Barrow. Then came a time when it seemed desirable to start a cargo service on the main line in addition to the regular mail sailings; and for this duty there were built such vessels as the new single-screw *Magellan*, a vessel launched in 1893 at Belfast by Messrs. Harland & Wolff. She is of moderate size, say, 3,606 tons gross register, of 360 ft. in length but of 43 ft. beam. Two years later the twin-screw principle secured practical recognition at the Company's hands and from the same yard of Messrs. Harland and Wolff the Company obtained its mail steamer *Oropesa* of 5,352 tons gross register. She is of a length of 421 ft. with 48 ft. 8 in. beam, and is propelled by two sets of three-cylinder engines. She was quickly followed by her sister, the *Orissa* and by the *Oravia*. This principle commended itself not only for the main line vessels, but also for steamers in those services which in early days had appeared most suitable for the paddle-wheel type of ship, and thus at the present time the Company owns no fewer than eighteen twin-screw liners

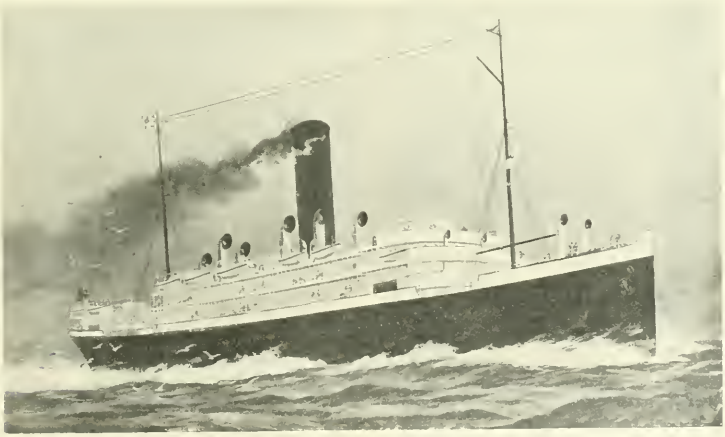
Santa Rosa and *Colombia*, built 1873, length 320 ft., 1,850 tons.

Orizaba, built 1886, 6,077 tons, 1,200 h.p., length 460 ft. breadth 49 ft. 3 in.

The largest steamer as yet at work in the fleet is the *Orcoma* of 11,533 tons gross register, built in 1908 at Glasgow by Messrs. Beardmore. She is upwards of 511 ft. in length and is fitted in the luxurious fashion characteristic of the day, her electric appliances including a passenger lift. The state rooms are arranged on the tandem system invented by Mr. Bibby, for many years chairman of the Company's Board. This device gives all rooms outside port-holes. This vessel, like most of the fleet, is fitted with wireless telegraphy and a submarine signalling receiver. The *Orcoma* in the year 1909 made two records in speed, making the best passage hence to the River Plate and then on to Valparaiso.

A large building programme is now in hand, the Company having adopted the combination of high-pressure reciprocating engines, driving two wing screws, with a central propeller driven by a turbine which uses the low-pressure steam after it has done its work in the reciprocating machinery. Six vessels are now to be built. Four will be of 15,000 tons each. They are to be named *Andes*, *Ormeda*, *Orduna* and *Orca* respectively. Names and details of the other two new vessels, which will be of ten thousand tons each, are at present la king. The present total tonnage of ships built and building under the flag is put at 243,003 tons gross register.

The public services which the Pacific Company have rendered from time to time are sufficiently apparent from its history. It showed the Red Ensign in the Pacific over the earliest steamers in those waters, and has done much to maintain our commercial supremacy in South American seas. During the years in which it was so closely associated with the Fairfield firm of shipbuilders it gave practical trial, not only, as we have seen, to the first attempts at compounding the steam engine, but also to Mr. John Elder's device of feathering floats in its large and high-power paddle steamers, whereby the inconvenience of back water lift was almost



Twin-Screw R.M.S. *Orcoma*, built 1908, by Messrs. Wm Beardmore & Co., Ltd., Dalmuir, 11 546 tons, 16 knots, length 511 ft., beam 62 2 ft.

Smoke room of the R.M.S. *Orcoma*.

entirely abolished, with, of course, a consequent and proportionate increase in the efficiency of the machinery and a corresponding economy in coal consumption. These developments, though eventually useful to the shipowning community at large, were, of course, primarily undertaken in the Company's own interests. But in other directions it has done good service, as for instance, in providing vessels for the public service in times of national stress. An example of its work in trooping may be seen in the history of the charter of the s.s. *Orcana* to the Government in November, 1900, when she served for nearly two years during the pressure of the South African campaign.

Of late competition in the South American trade has been keener than it has ever been before. French, German, Italian and Spanish liners are now in the regular habit of making sailings to South American ports, and some of the foreign steamships are passenger vessels of a high class. To the River Plate there are several British lines of importance, notably the Royal Mail Company with which, as we have seen, the Pacific Company had so much in common at various periods of its history. The opening of the Transandine railway some two or three years ago introduced a new factor into the problem, and one whose exact effect seemed difficult to forecast. Two things seemed abundantly clear, namely, first, that for the good things that are undoubtedly obtainable in South American waters there are, and are likely to be, plenty of claimants, and second, that the spoils are certain to go to the strongest amid the various rivals. The possibility of a rate war, especially with two strong British companies amongst the antagonists, seemed a thing which should if possible be avoided at all costs, and so the Royal Mail Steam Packet Company under the chairmanship of Sir Owen Philipps, M.P., decided to make common cause with the Pacific Company. An offer was made for the purchase by the Royal Mail Company of the stock of the other line, and it was accepted by the shareholders. The move has already enabled many economies to be effected. Common offices serve the two Companies in such important places as London and Liverpool, whilst in less important centres common agencies represent them. The vessels of the two Companies too, have now the advantage of the various facilities provided by either in distant ports. But as yet the fleets and the sailings are kept distinct, though the schedules of intended despatches are advertised together. The combination has more recently been further strengthened by the introduction of another partner in the Lamport and Holt Line, another old-established Liverpool company. That mutual interworking and a common direction of this powerful combined fleet will make for efficiency can hardly be denied. But the Pacific Steam Navigation Company has a history of which any line may be proud and has maintained its high traditions for some seventy years. It would, therefore, cause a profound regret to many people outside those immediately connected with the undertaking if the stern exigencies of modern business were to render it necessary for the fleet and the Company to be absolutely merged in the business of those who now have its control.

NAVAL MATTERS—PAST AND PROSPECTIVE.

(*From our Own Correspondent.*)

Portsmouth Dockyard.

WHAT with the agitation for increased pay among the workmen of the engineering trades, and the publication of the Navy Estimates and the accompanying programme of work for the coming financial year, the past month has been full of incident for us, and, of course, for the other public dockyards. The movement among the engineers has assumed definite shape during the month, and an ultimatum has been sent to the Admiralty to the effect that if the requests put forward by the men are not granted a favourable reply in March, a conference of representatives from all the dockyards will be called with a view to arranging a general line of action to enforce these demands. The men have secured the support of the local Trades Council, and a large mass meeting of all classes of dockyard workers on March 17th was addressed by Mr. G. N. Barnes, M.P. While the attitude of the men is determined, there are not a few who disagree with the length to which things have been carried. It is pointed out that while from the men's point of view the present time of extraordinary activity in the shipbuilding industry may be favourable to an agitation of this sort, from the national standpoint it would be regrettable to have any retardation of work, both as regards new construction and repairs, and the fear is expressed that in case of a stoppage a share of both will be given to the private establishments. The men, however, know that the latter can take very little more work with their present limited supply of skilled labour, hence they are more independent than might otherwise be the case. The ships in hand include the battleship *Dreadnought* and the battle cruisers *Indefatigable* and *Princess Royal*. The arrival of the latter vessel at this yard instead of at Devonport, where she has always hitherto been docked, illustrates the advantage to this establishment of the floating dock, for we have no graving dock large enough to take this vessel, at present the heaviest in the Service. The battleships *Hindustan* and *Superb* have left after completing their refits, and the *Southampton*, which had been under the Port Admiral's orders since November, had her nucleus crew completed to full numbers on February 25th, and left three days later to join the First Battle Squadron, in which she replaces the *Liverpool*. It is significant that the last-named vessel, although only completed in 1910, is being reduced to nucleus crew for service in the Fifth Battle Squadron, as is her sister-ship the *Bristol*. The Fifth Battle Squadron is thus being placed on the same footing as regards light cruisers as the squadrons which are fully manned all the year round. The battle cruiser *Australia* arrived from the Clyde on March 12th, carrying out satisfactory trials on the way, and after embarking specialist officers left again for her gun and torpedo trials, which are in progress at the time of writing. Excellent progress has been made with the new lock, which is almost ready for use; and the *Victory* has now been replaced at her old moorings off Gosport. The *Iron Duke* is having her armour plates and other heavy fittings shipped, for which purpose she has been placed under the new electric crane which has been provided between the two large basins. This crane should prove a useful addition to the equipment of the yard, for it has a lifting power of 250 tons. It is fitted on top of a high tower, built of steel girders, and has a radius of 105 feet. The programme of work for the coming year disclosed in the Navy Estimates may be said to come up to general anticipation. Although there were those who expected two battleships to be allotted to us within the year, there is only one to be built as usual, but from the increased sum to be spent on this ship it is evident that she can, and probably will, be laid down even earlier in the year than was the *Queen Elizabeth*. The sum allotted, £215,346, is more than double that spent on the *King George V.* in the first year of her construction. The large refits to be executed do not include any for battleships, but the cruisers *Invincible, King Alfred, Donegal, Kent, Doris,* and *Isis* will be taken

in hand, and over £100,000 has been set aside for the re-armament of the scouts *Pathfinder, Sentinel,* and *Skirmisher,* which are, by the way, to have nine 4-in. guns instead of the ten or fourteen 12-pounders they have hitherto carried. The works vote contains no surprises as regards Portsmouth, but the sum of £28,000 is taken under it for additional storage accommodation for oil fuel, and £89,200 and £75,000 respectively are allotted to the two new locks and the extension of No. 14 dock.

Devonport Dockyard.

We have been witnessing somewhat stirring times from a labour standpoint of late, and the movement in favour of higher rates of pay has culminated in the declaration of a strike against overtime by the members of the Amalgamated Society of Engineers. The order for the "overtime strike" was issued on March 7th, and has so far been strictly observed by the 1,200 coppersmiths, fitters, pattern-makers, smiths, and turners belonging to the union. Unless something is done to settle the dispute, therefore, before very long, its effects will be felt in the Fleet in an increase of vessels in need of dockyard refits, for it is principally upon refitting work on the big ships that overtime has been worked of late. Not only have we a larger share of this work than any other dockyard, but the strike has been declared during a busy season for repairs. There does not seem much likelihood at present of a total cessation of work, but the men, in common with those at other yards, are earnest in their demands, and might support such a course at the joint conference which is being suggested. By the time these notes appear the new Commander-in-Chief, Sir George Egerton, will have succeeded Sir William May on his promotion to Admiral of the Fleet. There has been steady progress made during the two years Sir William May has been at Devonport, and many were the congratulations he received on his promotion to the highest rank in the Service. We are full of work both in the constructive and refitting departments, and besides the vessels in dockyard hands many others have come in to give Easter leave. The *Centurion* has not yet left to join her squadron, but the *Temeroire's* refit has been completed, and the *Orion* and *Collingwood* have also been passed out of dockyard hands. The *Temeraire,* besides having some new horizontal armour plates fixed to the crowns of her magazines for protection against projectiles coming from aloft or falling with a wide angle of descent, has had her fire-control equipment improved by the installation of a set of range-finding appliances in the fore barbette, behind armour protection. It is understood that the course which has been taken in the later ships of the *Orion* type of providing casemate protection for the anti-torpedo armament of 4-in. guns is to be followed in the *Bellerophon* class when next they become due for refit. The *Collingwood* has been made ready to resume her duties as flagship of the First Battle Squadron, which have been temporarily discharged by the *Vanguard,* and the latter arrived on March 14th to transfer the flag of the vice-admiral. There has been further delay in making the new battleship *Conqueror* effective, but she has been commissioned. The gun-mountings in this ship have been manufactured and supplied by the Coventry Ordnance Works, and possess some new features in the recoil arrangements which, like most innovations, required certain adjustments before they could work quite efficiently, hence the delay in completing the ship for sea. It is significant, however, that the four "contingent" ships of the 1909-10 programme, of which the *Conqueror* was one, were all to have been completed by March 31st, 1912, so that the total period for which the *Conqueror* has been retarded from all causes amounts to a whole year. Having finished her refit, the *Suffolk* was commissioned on February 27th for service as flagship of the newly-formed Fourth Cruiser Squadron, which consists for the present of the *Suffolk, Berwick,* and *Donegal.* A fourth ship of this type, the *Essex,* now out of commission here, will be refitted in the coming year at a cost of £77,901, and will then probably be added to the squadron. The light cruiser *Pegasus* was recommissioned on March 11th for service on the Cape Station in place of the *Pandora,* which recently paid off here, and has since been placed in the material reserve. The programme of new work for the coming year, in connection with which Sir Francis Hopwood, Sir James Marshall, and Rear-Admiral Waymouth visited the yard on March 7th for a conference with the officials, includes the building of a battleship, but not of a light cruiser, and apart from the large refit to the *Essex* already mentioned, the cruisers *Monmouth* and *Diana* will also be taken in hand, and the scouts *Adventure* and *Attentive* will be fitted with their new armament.

Chatham Dockyard.

Our share of the work under the new Navy Estimates is quite up to the average, and promises to keep the yard well employed during the year. As regards new construction, another light cruiser, presumably similar to the *Arethusa,* will be begun, and £50,424 is provided for her. Very vague is the information about submarines, but there is an idea prevalent that an important development in design in this class is about to be made. Instead of two submarines, as has been the rule during the last four or five years, only one is to be laid down, and £17,288 is provided for her construction, as compared with £36,376 for the two boats last year, and £16,037 for the two of 1911-12. Turning to repair work, large refits are provided for in the cases of the *Duncan, Leviathan, Hogue* (£97,494 being taken for this ship), *Cumberland, Diamond* and *Sapphire,* as well as scouts and smaller vessels. Steady progress is now being maintained with the work of past programmes. The cruiser *Lowestoft* laid down last July, is expected to be launched on April 23rd. As very little is known concerning this, the latest type of "City" cruiser and apparently the last that will be built for some time, it may be said that the displacement of the *Lowestoft* will be 5,440 tons, or slightly more than that of the Chatham type, and as compared with the latter an extra 6-in. gun is to be mounted, making nine weapons of this calibre altogether. There is a belt of side armour in both classes. The *Topaze* has completed her long refit, and on March 9th was joined by a navigating party for trials, after which she will resume duty as parent ship of the Sixth Destroyer Flotilla. She has been absent from the Fleet since July last, the *Minerva* replacing her temporarily. Of ships undergoing short refits, the *Formidable,* whose crew was reduced to Third Fleet complement whilst in dockyard hands, will have returned to duty in the Fifth Squadron by the time these lines appear, March 27th having been fixed as the date for her reversion to the Second Fleet. The *Indomitable* has completed her refit, although she remains in England for the present instead of going to the Mediterranean as expected, and the *Natal* is still in hand. The proposal to remove the Medway floating dock to Cromarty has been received with mixed feelings, for while the dock has added enormously to our facilities for docking and repairing the larger vessels of the Fleet, the increased cost of working it and the distance which has to be travelled by the workmen in going backwards and forwards from Chatham every day have not made it so successful as the Portsmouth floating dock. The officer just appointed for duty in connection with the developments at Cromarty, Commander D. J. Munro, is well known at the Nore, for he was for some seven years assistant to the commander of Sheerness Dockyard, during which time he was employed upon a good deal of salvage and other special work. He has been at Rosyth as King's Harbour Master since July, 1911.

Sheerness Dockyard.

With an influx of ships of all classes for Easter leave, there has been a good deal of movement in the port and dockyard during the past month. The cruiser *Berwick* arrived from Chatham on March 13th after having repaired the damage sustained in collision with the *Dido* of Port Victoria, and she is ordered to be recommissioned at the end of the month with the crew of the *Irresistible* for further service in the Fourth Cruiser Squadron. On the same day that the *Berwick* arrived, a crew from Chatham joined the new destroyer *Cockatrice* at the works of Messrs. Hawthorn Leslie on that vessel's completion. This is the third of the twenty destroyers of the 1911-12 programme, ordered by contract in July, 1911, to be delivered, the previous two being the *Acasta* and *Christopher,* which like the *Cockatrice* were allotted to the Nore command for manning. We are expecting seven more boats of the same programme here before the summer to relieve

the Tribal class in the Fourth Destroyer Flotilla, the Tribal vessels then joining the Fifth Flotilla. Although of about the same displacement, there are many points of difference between the Tribal class of 1906 and the *Acasta* class of 1912, the latter boats being designed for 29 instead of 33 knots and carrying three instead of two 4-in. guns, while their horse power is 24,500, as compared with 14,500 in the earlier vessels. The trend of design has evidently been to go in less for speed, and to develop instead the offensive power, radius of action, and sea keeping capacity. The first submarines of the "E" type have been running trials during the month, but only one, the E1, has been actually completed. This leaves five in hand at Chatham Dockyard, E2 (1910-11 programme), E7 and E8 (1911-12), and E12 and E13 (1912-13). Talking of construction work reminds one that none of this has come to us again in the programme outlined in the Navy Estimates, issued on March 13th, but there is some repair work which will keep our resources employed. The torpedo gunboats *Circe*, *Leda* and *Skipjack*, the first-named in the mine-sweeping flotilla and the other two under the orders of the Admiral Commanding the Coastguard and Reserves, will come in to be refitted, but it is not stated what sums are to be spent upon them, and in addition we shall, of course, get a fair share of the £117,028 voted for the repair of destroyers during 1913-14. There is a sum of £32,201 for "Yard Craft No. 296," a salvage and mooring lighter, to be built by the Dundee Shipbuilding Co., for service here, so that the authorities are evidently alive to the necessity of adding to our equipment in this respect, for it was only the other day that Messrs. Vickers launched the water tank and salvage vessel No. 96, which is also for service here.

Pembroke Dockyard.

There is every reason for satisfaction with the amount of work allotted to us during the coming financial year. The principal item in it is the building of two more "light armoured cruisers"—a fair proportion of the eight vessels of this type in the new programme. On the first to be laid down, a sum of £178,048 will be spent, which is well above the average of the "token sums" usually taken for starting such ships in the first year. The second cruiser will absorb £77,586, which also indicates that a good deal of work will be done upon her before next March. Two years ago, when only one ship was allotted here in the original plans, £76,931 was sanctioned to be spent upon her. Over three times as much money is thus to be spent on the beginning of fighting ships during 1913-14 than during 1911-12. It is not certain how the refitting work will stand in comparison with past years until the proportion of repairs to torpedo craft to be awarded to us is known. The only vessel definitely assigned to the yard for refit during the coming year is the torpedo gunboat *Antelope* until recently employed as tender to the submarine flotilla. Simultaneously with the official disclosure in the Estimates that the project for building a new hospital ship for the Navy had been abandoned in favour of the purchase of an existing vessel for conversion to this duty, the vessel so selected arrived here from Barry Dock. She is the *Heliopolis*, of 2,067 tons, and presents a somewhat unusual appearance with her high freeboard for a ship of this size. The official statement accompanying the Estimates states that she will be renamed the *Mediator*, the name originally chosen for the new ship which was to have been built. The latter first appeared in the Estimates of 1911-12, when £8,115 was voted for her; in the next year £68,838 was put down for her, but in the new Estimates not a penny of this is shown to have been spent at all. There is a new provision of £255,282 for the *Heliopolis*, if after trial and survey she proves suitable for the work of a hospital ship.

TRIAL TRIPS—(continued).

Somersby.—On March 3rd, the new steel screw steamer *Somersby*, built at Stockton-on-Tees, made her official trial trip. The steamer has been built to 100 A1 Lloyd's, and is for Messrs. R. Ropner & Co., West Hartlepool. She has a deadweight carrying capacity of about 6,200 tons. The engines are of the triple-expansion type, of about 1,950 i.h.p., taking steam from two steel boilers. On her trial the ship behaved in a thoroughly satisfactory manner, attaining a speed of about 11 knots. She afterwards proceeded to Dunston to load. For Launch, see March issue.

OBITUARY.

Sir William White.

THE sudden stroke of death has removed from the midst of his activities Sir William Henry White, K.C.B., formerly Director of Naval Construction and undoubtedly one of the greatest designers of warships whom the world has ever known. Since his retirement from the official employment of the Admiralty he has had an office in Victoria Street, Westminster, and on the 27th February he appeared to be in his usual health and attended as was his wont, at his work. When luncheon time came he rose to go out, fell back in a fainting fit, and was taken at once to the Westminster Hospital which is hard by his office. There it was found that he was suffering from a paralytic seizure and at 6.30 he passed away. His end came as a great shock to those who knew him, and they were legion. The thought that they would never see his kindly smile again or hear his

Sir William Henry White.

words of encouragement was a grievous blow. But for himself no one could regret that so active a life terminated in the midst of its activities and that Sir William was spared the tedium and restraint of a long illness.

Sir William was in every sense a self-made man. He owed nothing to birth or connections, everything to his own ability, hard work and personal characteristics. Born in the year 1845, at Devonport, he was entered when fourteen years of age as an apprentice in the Royal Dockyard there. After about five years' work in the yard his first opportunity came to him. The Admiralty, after two unsuccessful attempts at establishing a school of Naval Architecture, inaugurated the Royal School at South Kensington in the year 1864. An examination being held for the candidates who came forward for entrance, young White came out at the head of the list, and during the three years during which he pursued his course there, gave further proofs of his ability and industry.

In 1870 he entered the service of the Admiralty and was appointed instructor at the School of Naval Architecture. In 1875 he became assistant constructor to the Royal Navy and a year later secretary to the Council of Construction of the Royal Navy, Sir Nathaniel Barnaby being President. In 1881 he was made a chief constructor. In 1883, having left the Naval service, he undertook the organisation and management of the shipyard department of Messrs. Armstrong and Co., at Elswick. There, however, he only remained two years. For the Admiralty found they had need of him again, and back he came to the public service as Director of Naval Construction and assistant controller of the Navy.

Now came the important stage in his career. He soon made a mark which has imprinted itself, not only on the British Navy but on the fleets of every Maritime Nation in the world. He evolved the "*Admiral*" class of battleships, a type which, with the necessary alterations and developments which invention and experience have rendered possible, has been the prototype of all subsequent warships of the line. Not only were the "*Admirals*" themselves remarkable ships, but the homogeneity of the class was in itself a new thing, providing as it did a squadron of eight vessels whose tactical qualities were identical and whose use in war was consequently increased by their equality. Previous to his advent to the direction of affairs our navy had consisted of a collection of samples in which divergent ideas had been carried in some cases to extremes.

Sir William White changed all that.

Immediately upon his appointment he had the task of expressing in ships the Northbrook programme, which was the beginning of Britain's awakening to the need for the extension of her fleet. Then under the Imperial Defence Act of 1887 there had to be provided the five protected cruisers and two torpedo gun-vessels which were sent out for permanent service on the Australian station But the greatest undertaking was the building of the seventy warships of the Naval Defence Act of 1888, at a cost of 21½ millions sterling. Altogether when he left the service in the year 1902 on account of failure in health, he had been responsible for the design of no less than 245 warships at a cost of upwards of 100 millions of money. This fleet included :—

43	battleships
26	armoured cruisers
21	first class protected cruisers
48	second class ,, ,,
33	third class ,, ,,
74	unarmoured vessels.
245	

This total, it will be observed, is irrespective of the large number of destroyers and torpedo boats which were constructed during his tenure of office. And above let it be remembered not one vessel that he built was in any way a failure, save the *Victoria* and *Albert*, a Royal yacht, which at first was not altogether stable. Sir William with characteristic loyalty never disclaimed responsibility for this vessel, though it is well known that absurd alterations were forced upon him after the main design was settled, and fittings involving the addition of heavy weights introduced into the upper part of the ship at the suggestion of outsiders, who knew nothing of the limitations which compass the ship-designer on every side.

After his retirement, when Parliament made him a special money grant, he was consulted in regard to design of hull and machinery by the Cunard Company and by the builders of the great Cunarders which have been so successful in obtaining and retaining the blue riband of the Atlantic and became a director of Messrs. Swan, Hunter & Wigham Richardson. He was also generally engaged as a consulting naval architect in his London office.

Amongst the numerous scientific societies with which he was connected may be mentioned the Institution of Naval Architects, of which he became a member in 1871, and subsequently a vice-President ; the Institution of Mechanical Engineers, the Institution of Junior Engineers, and the Institute of Marine Engineers, of which societies he was past president. He was also chairman of the Society of Arts, besides being connected with many other societies both at home and abroad. He was also a Fellow of the Royal Societies both of London and Edinburgh. In 1903 he was president of the Institution of Civil Engineers and at the time of his death was President Elect of the British Association for the Advancement of Science.

Amongst more public honours he was made C.B. in 1891, K.C.B. in 1895. He was also an LL.D. of Glasgow, D.Sc. of Cambridge and Durham. He married twice, his first wife, who was the daughter of Mr. F. Martin, a Chief Constructor in the Navy, dying in 1886, he married for the second time Miss Marshall, of Tynemouth. A family of three sons and two daughters survive to mourn his loss.

Arnold J. Henderson.

WE put on record with regret the death of Mr. Arnold J. Henderson, a director of the firm of Messrs. David and William Henderson and Co., Ltd., shipbuilders and engineers, Meadowside, Glasgow, which took place on March 6th, at his residence of Southfield, Newton Mearns, following upon an attack of pneumonia. Deceased, who was only in his 35th year, was a son of the late Mr. John Henderson, of Meadowside, a nephew of Mr. A. P. Henderson, and a cousin of Mr. Fred Henderson, two of the present principals in this well-known firm. He was trained at Meadowside as a shipbuilder, and has ever since been engaged in the service of the firm. He was one of the ablest and most popular of the younger class of shipbuilders and was universally esteemed, not only by those with whom he came into direct contact at the works, but by all with whom he had dealings in the course of business outside. He leaves a widow and two young children.

AUSTRALASIAN INSTITUTE OF MARINE ENGINEERS.

IT is with regret we have received intimation of the death of Mr. Tom G. Johnson, who was District Secretary at Brisbane. Born in 1851 (Derbyshire), after shore and sea service he settled in Queensland about the year 1882. After some service on the coast he started as a consulting engineer and teacher and lecturer in technical schools at Brisbane and Ipswich. He was associated with others in founding the Australasian Institute of Marine Engineers and took a keen interest in all work that was for the good of the engineering community from the essential quality of his character, altruism. He was a member of the Marine Board of Queensland and of the Board of Examiners in the machinery department. We offer our sympathy to Mrs. Johnson, who is left alone in her sorrow. The new Secretary appointed is Mr. J. W. Chew.

Burst Boiler Tube.—An accident, attended unhappily by a fatal result, occurred recently on board a steam barge. The barge had conveyed some cargo up the river Thames and was lying in St. Katherine's Dock, when the engineer-in-charge, hearing a sound which indicated a leakage in the boiler, opened the fire door to see what was wrong. While looking around the firebox a tube burst and the water at once flowed with force upon the open doorway, scalding the engineer so severely that, although removed promptly by the ambulance boat, which happened to be near, he died in Guy's Hospital within two days—in the beginning of March. Much sympathy has been aroused on behalf of the widow—Mrs. Mackenzie—who is left with four young children. The Royal Scottish Corporation, to whom the case has been reported, is assisting the widow, and the Royal Caledonian Orphanage has under consideration the question of admitting two of the children into the orphan home at Bushey.

Industrial and Trade Notes.

THE CLYDE AND SCOTLAND.

(From our Own Correspondent.)

THE output of tonnage from Clyde shipyards during February amounted to 47,050 tons gross, made up by seventeen vessels, and was thus a great advance on that of January, which consisted of only 9,750 tons, made up by five vessels, one of which was of 5,800 tons, or very considerably over half the total. Contributing to the February output were six vessels ranging in tonnage from 4,350 tons to 7,000 tons, the latter figure applying to the s.s. *Nagova*, launched from the yard of Messrs. Caird & Co., Greenock, for the P. & O. Co. The output for the two past months of the year, *viz.*, 57,000 tons, compares with 83,000 tons for the corresponding period last year and with 66,000 tons in 1911. Activity in launching has characterized the month of March so far as it has gone, several notable contributory items being the *Alsatian*, an Allan liner approaching 20,000 tons, sent off the stocks by Messrs. Wm. Beardmore and Co., Dalmuir, and the *Andania*, a Cunard liner of 9,000 tons, launched from the yard of the Scott Shipbuilding Co., Greenock. Certainly within the next few weeks the shortcomings of January and February will be more than counterbalanced, one item alone being the huge Cunard liner *Aquitania*, of about 60,000 tons, to be sent off the stocks at Clydebank on 21st inst.

Since the time of writing the notes for last issue, the ordinary run of events on the Clyde connected with the speed trials and despatch to their destined place of service of new vessels, has been signalized by the completion and departure of an unusually large number of ocean liners of the highest class—several of which have very notable features as concerned with propulsion. Including two vessels which at time of writing are completing their trials prior to being handed over, as many as seven steamships, all over 8,000 tons, and four of which are propelled by twin, two by triple and one by quadruple screws, have been turned out by the Clyde builders and engineers. It is only possible here to simply enumerate these:—The *Nevasa*, twin-screw, 9,500 tons gross, about 16 knots speed, built and engined by Messrs. Barclay, Curle & Co., for the British Indian Steam Navigation Co.; the *Willochra*, twin-screw, 8,000 tons, 16 knots loaded, built and engined by Messrs. Wm. Beardmore & Co., for the Adelaide Steamship Co.; the *Canberra*, twin-screw, 7,800 tons, 16 knots loaded, built and engined by Messrs. Alexander Stephen & Sons, Ltd., for the Howard Smith Co., Ltd., Melbourne; the *Benalla*, twin-screw, 11,000 tons, built and engined by Messrs. Caird & Co., for the P. & O. Co.; the *Niagara*, triple-screw, 13,400 tons gross, built and engined by Messrs. John Brown & Co., Ltd., for the Canadian Australasian Royal Mail Line; the *Empress of Russia*, quadruple-screw, 15,000 tons, 20 knots speed, built and engined by the Fairfield Shipbuilding and Engineering Co., for the Canadian Pacific Railway Co., and the *Infanta Isabel de Bourbon*, triple-screw, combined recipro-turbine engines, 9,750 tons, 18½ knots speed, built by Messrs. Denny Bros. and engined by Messrs. Denny & Co., for the Compania Trasatlantica Co., Cadiz. In all cases the vessels are noteworthy as regards the accommodation provided for passengers, or for combined passenger and cargo service.

The orders placed since the year began have been arranged mostly during the latter half of February and first half of March. Owing to the high prices at which builders have to tender and the absolute inability of most firms to promise definite and reasonably early delivery, through the congestion of contracts under way, a great deal of work is known to have been withheld until matters better adjust themselves. The most important of the orders placed includes one for as many as six steamers, each of about 450 ft. in length, which Messrs. Barclay, Curle & Co., Ltd., Whiteinch, have been instructed to build for the British India Steam Navigation Co. It is believed, however, that of this wholesale order for six steamers—aggregating at least 35,000 tons—two, if not three, will probably be built at Wallsend-on-Tyne, in pursuance of the Merger arrangement recently effected between Messrs. Barclay, Curle & Co., and Messrs. Swan, Hunter and Wigham Richardson.

Messrs. **John Brown & Co., Ltd.**, Clydebank, who have now the work of launching ways and make-up underneath the huge Cunard liner *Aquitania* well advanced for her send-off on April 21st, are the successful tenderers for the new liner for the Orient Steam Navigation Co. Along with the Clydebank firm, who, it will be remembered, built about a year-and-a-half ago, the *Orama*, the latest addition to the fine Australian fleet of this Company, other four firms tendered for the new vessel. Two of these each built one vessel for the Orient fleet several years ago, these being of the ordinary twin-screw type. The *Orama*, on the other hand, had two sets of four-cylinder triple-expansion engines, and a low pressure Parsons turbine, the latter driving the central of three lines of shafting and propellers. No particulars of the new vessel have yet been made known; but it is assumed that she will be propelled on the same lines as the *Orama*, and will be an improvement on that vessel in respect of accommodation and equipment.

Messrs. **Harland & Wolff**, in connection with the question of fully occupying the whole area of the shipbuilding works they some time ago acquired at Govan and are now partially carrying on just as taken over from the former occupants, the London and Glasgow Shipbuilding Co., have submitted to the Clyde Trust proposals as to re-modelling and extending the premises. In view of the important questions involved, affecting the interests of the Trust, it has been remitted to a sub-committee to confer with the firm and report. The firm, as has already been reported, have not only acquired the whole of the works, including the new tidal dock, of the London and Glasgow Co., but the adjoining premises hitherto occupied by Messrs. Mackie and Thomson, abutting on the Govan ferry recess, and not only so, but the area to the west of the ferry recess at present occupied by Messrs. Hugh McLean & Co., Waterrow Boatbuilding Works. Both Messrs. Mackie and Thompson and McLean & Co. will relinquish tenancy very shortly, and after the scheme of extension has been approved of and carried out, Messrs. Harland & Wolff will have a river frontage to their works extending from the Clyde Trust graving docks almost to the Parish Church at Govan, a length of close on half-a-mile.

Messrs. **Mackie & Thomson**, Govan, who will shortly begin transferring operations to their new yard at Irvine, on the Ayrshire Coast, have just purchased, through Glasgow agents, about two acres of land opposite their new yard for the purpose of forming a tidal basin for ship outfitting purposes.

Messrs. **Barclay, Curle & Co.**, Whiteinch, on behalf of the North British Diesel Engine Works, who have acquired the lands of Jordanvale, early in March applied to the Clyde Trustees for permission to make a recess of 110 ft. wide in the river bank along the frontage, extending to about 910 ft., to form a private quay for the fitting-out of new vessels. It was agreed to grant the application subject to an agreement with the Diesel Company.

Messrs. **Fleming & Ferguson**, Paisley, who launched early in March a hopper barge of 1,000 tons capacity, have other two vessels of the same type and capacity on the stocks, the three being to the order of the Crown Agents for the Colonies, for service in reclamation work at Lagos, West Africa.

Messrs. **Dunlop, Bremner & Co.**, Port Glasgow, have received from Messrs. Thomas Wilson, Sons & Co., Hull, an order for a duplicate of the steamer *Serbino*, which they launched for that firm last month.

Messrs. **William Denny & Bros.**, Leven Shipyard, Dumbarton, and the conjoined engineering firm of Messrs. Denny and Co., have contributed very extensively, and over long periods of years, to the fleets of not a few of the best known and old-established shipping concerns; but their association in this way with the ship-owning firm of Messrs. Patrick Henderson & Co., Glasgow, is perhaps more noteworthy than in other cases of the kind which might be mentioned. This subject was alluded to in the course of the speeches following the launch of the steamer *Pegu* from the Leven shipyard, about the end of February. The *Pegu*, it was pointed out, was the thirty-second vessel which the Dumbarton firm have built for Messrs. Henderson, as managers of the British and Burmese Steam Navigation Company. They were first entrusted with an order from the Glasgow company forty-two

years ago, when they built a vessel for the Rangoon trade. It is interesting to note that Messrs. Henderson placed recently an order for a steamer for the Irrawaddy Flotilla Company's service, and that this vessel brings the total number of ships constructed in Messrs. Denny's yard up to a thousand.

Scottish East-Coast Yards.—Trawlers and tugs again make up the major part—numerically at least—of East Coast of Scotland tonnage output, firms contributing being Messrs. A. Hall & Co., Aberdeen; Messrs. John Duthie Torry Co., Aberdeen; Messrs. John Cran & Co., Leith. Messrs. Ramage and Ferguson, Leith, launched a steel-screw steamer for Messrs. G. V. Turnbull & Co., Leith, 210 ft. in length and of 1,500 tons deadweight carrying capacity. The most important contracts booked on the East Coast recently are those secured by Messrs. Ramage & Ferguson, Leith, *viz.*, a steamer of about 7,000 tons carrying capacity, for the East Asiatic Company, of Copenhagen, and two passenger and cargo steamers, of about 300 ft. in length, for the British India Steam Navigation Company.

Ice-Observing Ship "Scotia."—One interesting overhaul job carried out at Dundee has been that to the whaler *Scotia*, referred to in our March issue. In a comparatively short time the vessel has been thoroughly overhauled and refitted by the Dundee Shipbuilding Co., and is now admirably adapted for the important duties she has been chartered to perform.

Floating Dock for Cromarty.—The new Naval Estimates provide for a floating dock of great lifting power, and it is understood the new dock is to be stationed at Cromarty, which in many other ways is being singled out as a naval station of importance. The dock is to have a lifting capacity of about 40,000 tons, in two or more self-contained sections, and will, therefore, be the largest structure of this kind yet built in this country. Only £25,392 is proposed to be voted for it in 1913-14, but this may be one of the contracts it is intended to expedite by means of a supplementary estimate later, when the pressure of work in the contract yards eases off.

Dock Gates for Rosyth.—The contract for the caisson for the third graving dock at Rosyth, has been placed with Sir William Arroll & Co., Ltd., Dalmarnock. The same well-known firm are constructing all the other dock gates for the new naval depot on the Forth.

TEES AND THE HARTLEPOOLS.

(*From our Own Correspondent.*)

Whitby.

The s.s. *Thordissa*, 2,317 gross, belonging to Messrs. Turnbull & Sons, has been sold to Francesco Degrossa, Genoa, for £10,400.

The Turnbull Steamship Co., Ltd. (Messrs. T. Turnbull and Sons) Whitby, are reported as having sold the s.s. *Whitehall*, 2,776 gross tons, to Spanish owners through Messrs. Thos. Pinkney & Sons, for about £14,000.

Middlesbrough.

Messrs. W. Richards & Sons, Ltd., Britannia Foundry, have bought the adjoining Atlas Works, for the manufacture of castings, pile shoes, etc., and to extend their bolt and nut-making plant.

Messrs. Sir Raylton Dixon & Co., Ltd., Cleveland Dockyard, are very full up with new work. Amongst the new work reported is a steamer about 375 ft. long and one of 360 ft. in length, of a very superior type, for the Booth S.S.C., Liverpool.

Messrs. W. Harkess & Son, Ltd., continue to be very busy on both old and new work, though nothing new is reported during the month. They expect to secure the order for a medium-sized steamer that is in the market.

Messrs. Smith's Dry Dock Co. continue as brisk as ever. Among the new contracts secured it is reported they are to build six small steamers of the trawler type, for the Russian Admiralty, presumably to be employed in the picking up of floating mines. Messrs. H. E. Moss & Co., Liverpool, have ordered a steamer 185 ft. long, to do 11 knots, for French clients.

Messrs. Richardsons, Westgarth & Co., Ltd., have several large marine contracts on hand for early delivery, and are laying themselves out for the manufacture of specialities, and are going in extensively for land work.

Stockton.

Messrs. Richardson, Duck & Co. continue to be as busy as ever, having sufficient work on hand to last them through the year. Enquiries are falling off for the better class of merchant steamers.

Messrs. Craig, Taylor & Co. have a large amount of work on hand, and are expecting to secure an order for a cargo steamer that is in the market, which will keep them busy all through this year.

Messrs. R. Ropner & Sons are reported to have secured the contract to build a medium-sized cargo steamer for local owners.

Messrs. Blair & Co. have a very large amount of work on hand, principally for steamer building on the Tees and Wear, also a set for a West Hartlepool steamer.

West Hartlepool.

Messrs. Furness, Withy & Co., Ltd., continue very active in the shipping world. They have sold the s.s. *Asamia*, 4,217 gross tons, to Japanese owners, for about £25,000; also the s.s. *Abana*, 4,189 gross tons, to Japanese owners, for about £21,000, through Messrs. Ashdown & Co.; also the s.s.'s *Arabania* and *Newport News* 3,001 gross tons; s.s. *Gloriana* 3,081 gross tons; *Ripon*, 2,965 gross tons, sold to Messrs. J. D'Haene, Antwerp. They are also reported as having placed an order with Messrs. W. Pickersgill & Sons, Sunderland, for two cargo steamers, and have recently added to their coasting fleet the s.s. *Tees Trader*, of 1,000 tons, built by the Dundee Shipbuilding Co.

Messrs. W. Gray & Co., Ltd., continue to be very busy. Amongst the new orders reported is a cargo steamer of about 7,000 tons deadweight, to be built to the order of Messrs. R. B. Chellew, Truro. Both yards of this firm are taxed to their utmost capacity, and preparations are being made for the new yard on the north banks of the Tees.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Ltd., Harbour Dockyard, continue busy on both old and new work. Amongst the new work reported is a second duplicate steamer of the s.s. *Blackhead*, to be christened the s.s. *Garron Head* for the Heyn Line, of Belfast.

Very slow progress is being made with the repairing of the pier at the West Hartlepool entrance, owing principally to the heavy weather that has been prevalent. Very heavy sand deposits have occurred at the entrance, which necessitated the building of a sand-pump dredger.

The Central Marine Engine Works of Messrs. W. Gray and Co., continue as busy as ever. Amongst the new contracts are the engines and boilers for the steamer to be built by them for Messrs. R. B. Chellew, Truro. Very extensive alterations and additions are being commenced at the works.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Middleton Yard, continue to be actively employed on the very large Holland-Amerika Boats. They have a large amount of work on hand, but nothing new is reported during the month.

Messrs. Richardsons, Westgarth & Co., Ltd., are busy in all departments. Amongst the new orders is the contract to supply the machinery for the second repeat order of the s.s. *Blackhead*. It is rumoured they have also secured the order to fit the machinery into two steamers to be built on the Tyne, for the East Asiatic Co., Copenhagen, to indicate about 2,000 h.p.

THE HUMBER AND DISTRICT.

(*From our Own Correspondent.*)

Hull and South Africa Direct Sailings.—A deputation from the Chambers of Commerce of Hull, Leeds, Sheffield, Ossett, Halifax, Heckmondwike, Bradford, Cleckheaton, Rotherham, and Lincoln waited on Sir Owen Phillips, the chairman of the Union Castle and Royal Mail Companies, at the offices of the latter Company in London, on March 12th. Mr. Dumoulin, an ex-president of the Hull Chamber of Commerce, introduced the deputation, pointing out that the visit was the outcome of a conference held recently at Leeds, when the following resolution was passed unanimously:—"That this meeting of the West Riding and other Chambers of Commerce, realizing the restriction of trade resulting from the very limited number of ports from which direct sailings

to South Africa exist, would gladly welcome the inclusion of Hull as an additional port to and from which such sailings should take place, especially as there would be a manifest saving in the cost of transit to most of the principal industrial centres in Yorkshire, Lincolnshire and elsewhere to Hull, as compared with other shipping ports." Mr. Dumoulin mentioned that the support of nearly all the Chambers of Commerce around Hull and in the whole of the West Riding had been obtained for such a scheme. Sir Owen Philipps listened very attentively, and promised to do his utmost and interview other steamship companies on the subject.

Mr. Thomas Mark Newell.—At the Royal Station Hotel, Hull, Mr. Newell, who has been recently appointed engineer-in-chief to the Mersey Docks and Harbour Board, was entertained to dinner by the officers of the North-Eastern Railway Co. and the Hull and Barnsley Railway and Dock Co., with whom he has been in close association in his capacity as one of the engineers for the construction of the new joint dock. A number of influential people were present, and Mr. Newell was presented with a silver cigarette case and a gold match box.

Humber Tunnel.—Arrangements have been practically completed in connection with the Humber Tunnel scheme to enable the promoters to deposit a Bill in Parliament at an early date. A plan of the proposed tunnel has been submitted, according to which the tunnel would be constructed at a point near Paull, and proceed direct to the Lincolnshire side of the Humber, thereby linking up the new Immingham Dock, Grimsby, Frodingham Ironfields, and the Midlands and the coalfields, and greatly shortening the distance to London. The tunnel depth from the surface would be from 150 ft. to 160 ft. The tunnel, if constructed in the vicinity of Paull, would be about 2 miles in length, whereas at Hessle it would be about 3 miles in length, and the bed of the river would not be so satisfactory. Another and important consideration in support of the shorter tunnel is that it would link up all the docks on both sides of the river. It is proposed to arrange meetings at Hull and Grimsby shortly in support of the project, and our informant was confident that the scheme would receive a considerable amount of support.

Goole.—A remarkable shipping mishap occurred this month in the Goole docks, resulting in completely wrecking a large iron bridge which carries pedestrians and vehicular traffic on to the docks from one of the main thoroughfares of the town. The steamer *Ezardiant*, belonging to the Goole and West Riding Co., Ltd., had just arrived in port, and was about to proceed to the town portion of the docks; the signal had been given for the bridge to be opened, and this was being done by hydraulic power, when the *Ezardiant* commenced to steam ahead; before she could be checked she crashed with considerable force into the bridge, and one half of it was clean cut off and sunk to the bottom of the docks. In consequence dock traffic was greatly impeded, while pedestrian and vehicular traffic was completely held up. The steamer also sustained some damage.

Obituary.—The death of Mr. F. Common at the age of 45, is recorded with deep regret. Mr. Common was chief draughtsman at the firm of Messrs. Cook, Welton & Gemmell, shipbuilders, Beverley, for over twenty years, and was well known by all trawler owners throughout the fishing ports. He belonged to Sunderland, and served his term of apprenticeship there in one of the shipyards. The funeral was attended by many principals at the fish docks, a number of Lloyd surveyors and mourners from Grimsby. Mr. Common leaves a widow and five children to mourn his loss.

We regret to record the death of Mr. T. Lindsay at the age of 74. Mr. Lindsay, who had retired from the sea for over thirteen years, was born at Glasgow and served his time in one of the yards on the Clyde. He started his sea-going career in Currie's steamers of Leith; then he came to Hull, and joined one of the early class of steamers in the Rotterdam trade, which he left after some time to join one of Messrs. Bailey & Leetham's steamers. The Empriza Nacional steamers of Lisbon next claimed his services, running on the west coast of African trade, in which he continued for over 29 years. He was a well-known engineer in Hull and Lisbon, and his funeral was attended by several old engineers of the Empriza Nacional of Lisbon and engineers of Hull.

Messrs. Hull Central Dry Dock Co., Ltd.—Since the commencement of the year this Company have been very busy, and have had to engage the public graving docks belonging the railway company in addition to having their own fully occupied.

Messrs. North-East Coast Engineering (Works), Hull, Ltd., have had a fair amount of work in hand during the month on the following steamers:—S.s. *Minaca*, s.s. *Bruta*, s.s. *Fox*, s.s. *Leopold*, s.s. *Queene*, s.s. *Nuttureton* and s.s. *Corinth*, besides several small craft. The *Corinth* has had very extensive repairs executed, the vessel undergoing special survey No. 2. The other mentioned steamers have undergone the usual repairs on deck and engine-room.

Messrs. Stewart & Craig, engineers and ship repairers, have had a great number of steamers through their hands, mostly for old clients. Amongst others there have been s.s. *Estria*, s.s. *Marina*, s.s. *Strathnairn*, s.s. *Orion*, s.s. *Muncaster*, s.s. *Goole Trader*, s.s. *Minnie*, s.s. *Hudikwal*, s.s. *Eddington*, etc. Prospects seem good for the month of April.

Messrs. Amos & Smith, engineers and boilermakers, are keeping fully employed in all departments, and have recently booked further orders for boilers and machinery for trawlers, etc., hence the outlook looks well. The outside staff of the western division of docks are kept well employed in general repairs and overhauling steamers, the branch works at Alexandra Dock are opening out engines and boilers for survey, etc., and graving dock work.

Thomas Tate, engineer and boilermaker, Clarence Engine Works, has had a fair amount of work in mills, also on the following steamers:—S.S. *Edith*, s.s. *Spurn Point*, s.s. *Taffy*, and tug boats *Trov*, boiler and engine repairs; *Midge*, engine repairs; *Jubilee*, engine repairs; *Excelsior*, new tail shaft and propeller fitted; also steam keel *Lincoln*, general repairs.

Messrs. Woodall & Co., engineers, etc., have had a fair share of steamers repair work coming to this port, and are also well booked up for orders for their patent derrick and cargo blocks for new steamers building at different yards. They are also working for several corporations and L.C.C. for smith work and have booked orders for stern posts and stem forgings for several small shipyards throughout the country.

Messrs. C. D. Holmes & Co., Ltd., engineers and boilermakers, have booked several orders lately for boilers and engines for trawlers. The different departments are kept fully employed and have this year turned out about 16 sets of engines and boilers for trawlers and are now busy fitting boilers and machinery into about four new trawlers. The boilers and machinery are under the supervision of Lloyd's survey. The branch shop at Alexandra Dock is having a share of repairs, and opening out for surveys, etc.

Messrs. Cooper & Co., Ltd., engineers and boilermakers, have been very busy during the month. The moulding shop has been fairly well employed and the branch shop at Alexandra Dock has been kept busy with graving-dock work; some of the steamers have undergone extensive repairs. The firm's own graving dock has been fully employed with coasting steamers, some of them undergoing heavy repairs, and the dock is fully booked up for another month.

Messrs. Cochrane & Sons, Ltd., shipbuilders, Selby, are exceedingly busy, and still booking orders for coasters, trawlers, tugs and barges for various parts of the country. They have just launched in one day two trawlers named the *Scott* and *Shackleton*, named after the South Pole explorers, for Messrs. Pickering & Haldane, of Hull. They are built to Lloyd's requirements for the Iceland fishing, and are now receiving their engines and boilers and fitting out at Hull.

Messrs. Earle's Shipbuilding and Engineering Co., Ltd., are keeping fairly busy with new and repair work. They have now on the stocks two steamers building for the Wilson Line for their Mediterranean trade, which will be fitted out with the latest appliances for receiving and discharging cargoes and will be built to the British Corporation requirements. The Company's patent slips are kept fully employed, also the outside staff with overhauling work on vessels in the docks. It is rumoured that Mr. W. S. Hide, superintendent engineer, Wilson Line, has been made managing director of Messrs. Earle's Co; he is also managing director for Messrs. Amos & Smith, engineers and boilermakers, Albert Dock Works.

SOUTH OF ENGLAND AND THE ISLE OF WIGHT.

(From our own correspondent.)

Southampton.- As these notes go to press about 800 local members of the Amalgamated Society of Engineers are on strike for an increase of wages. The engineers have asked for an increase of 3s. per week, basing their demands on the increased cost of living and the exceptionally high rents obtaining in the town and district. The employers made an offer of one shilling conditionally upon the men not asking for any readjustment of their wages during the next three years. This offer, after due consideration, was refused by the men. Negotiations have been broken off, and many of the local firms are locking out other men affected by the strikers. This trouble comes at a very busy time for many local firms who have a large amount of work on hand. A further meeting has been arranged, but it is unlikely that the employers' offer will be increased, and a satisfactory settlement seems hardly likely at present. The men have pickets posted at the dock gates, but up to the present there have not been any disturbances. Mounted police are patrolling the neighbourhood of the docks to keep order. The men on strike embrace fitters, turners, pattern-makers and blacksmiths. The work in many of the shops is being carried out by the apprentices in the trades affected.

Southampton.—At the time of going to press an enquiry was being held at the Guildhall, Bargate, into the causes and circumstances attending the bursting of a steam valve aboard the R.M.S.P. Co.'s steamer *Araguaya*. The commissioners appointed by the Board of Trade were Mr. A. A. Hudson, K.C. (Chairman) and Mr. Arthur J. Maginnis, M.I.C.E., M.I.Mar.E. Mr. George C. Vaux conducted the enquiry for the Board of Trade and Mr. Arthur H. Emanuel represented the R.M.S.P. Co. The Court examined the fractured valve and also inspected the ship, after which, on reassembling, Mr. C. W. Roberts, engineer surveyor to the B.O.T., said in his opinion the valve chest was sound, and that its failure was practically instantaneous by reason of water hammer action. The Court found that the explosion was caused by water hammer set up by the accidental opening of a drain cock on the chest. The Royal Mail Company were exonerated from any blame and the Court made no order as to costs.

Messrs. Simpson, Strickland & Co., Ltd., Dartmouth, S. Devon.—This firm continue busy in all departments and have just delivered a fine 25-ft. teak yacht's launch for Mr. A. M. Tree's s.y. *Adventuress*. This launch is built of teak and is fitted with enclosed triple s.c. engines, and an oil-fired boiler. A speed of over 11 miles per hour was obtained on trial. Two 31-ft. double-skin mahogany steam cutters have just been despatched to South America for the use of the Chilian Custom House. Two steam cutters are in hand for Brazil, and will be delivered shortly. An order has just been received for a 34-ft. motor cruiser hull. This will be completed in time for the early part of the coming season. Other orders include a fine 38-ft. motor tender for one of the leading steamship companies; a 17-ft. steam yacht's launch; and a 30-ft. steam tender for a mail steamer. There are also on order two steel tugs, 64 ft. and 63 ft. long respectively; a 60-ft. light draught launch for the India Office; and a 49-ft. light draught launch for South America. A fine triple-expansion engine has just been shipped for the University of Queensland, for instructional purposes, as well as a small c.s.c. engine for the same purpose.

"Olympic."—It has been definitely announced that the *Olympic* will be completed in time to take up her advertised sailing on the 2nd April, and at the time of writing she is expected at Southampton on Easter Sunday. It has been repeatedly asserted by the local gossips that the vessel could not possibly be ready by the time stated, but this rumour has now been uprooted, it is hoped without any damage to the Company's bookings. The return of the *Olympic* will enable the mid-week service to be performed by the White Star Co.'s vessels, and it will be run by the *Oceanic*, *Olympic* and *Majestic*. As is well known, the alterations to the *Olympic* have been of a very extensive nature, and the vessel has been brought up to the requirements outlined in Lord Mersey's recommendations, at a tremendous cost.

Messrs. John A. Thornycroft & Co., Ltd., Woolston Works, Southampton.—Work is proceeding on the seven torpedo boat destroyers for the Admiralty. The first of two paddle tugs for the Admiralty, the *Sturdy*, completed very satisfactory trials last month, giving a performance considerably above the contract conditions. Good progress is being made on the second vessel. Work in progress includes a Diesel engined yacht, passenger and cargo steamer for Trinidad, two lightships for Trinity House and a Canadian Customs cruiser. Last month a motor passenger vessel for New Zealand ran successful speed trials, and has since been shipped in pieces for re-erection at Auckland. A composite cargo vessel for Peru is fitting out, and the motors have been shipped. A considerable number of general engineering jobs have been carried out, and the marine repairs department has completed several important contracts during the month.

THAMES.

(From our own Correspondent.)

New P. & O. Boat.—This Company has had launched a new vessel, the *Nagoya*. She is of 7,000 tons gross register, and is the seventh of a group of ships known as the "N class" and designed more especially for the intermediate service between London and Calcutta and Japan, by which passengers are conveyed at lower fares than those ruling on the mail lines. Another vessel, the *Nellore*, is well advanced, and including these the Company has under construction at the present time ten vessels, aggregating 90,500 tons.

New Oil Tank Steamer.—The Eagle Oil Transport Company of Winchester House, had a vessel launched recently from Messrs. Swan, Hunter & Wigham Richardson's yard, which is the largest oil-tank steamer yet built. This vessel is one of nineteen built or building for the Company.

The Port of London Authority.—The first election of this body is about to take place, and as the sitting members, both representing vessels and goods, seek re-election, it follows that if any new candidates present themselves there must be a contest. Two master stevedores have come forward for the section representing vessels. It is eighteen out of the thirty members who have to retire on March 31st, nine in each department, and from the fact that the sitting members are seeking re-election it shows that the Authority has not waned in popularity during the four years of its existence. Due probably to the large works under construction by this body its stock has declined on the market somewhat lately, though perhaps this is only temporary.

Thames Iron Works.—A three days' sale has taken place of the Deptford Green Boiler Works, belonging to this Company, under an order of Court, and considerable interest was evinced. The prices realized were very good ones, barges built forty years ago fetching 50 per cent. of their original cost. In all some £10,000 was received during the three days, the plant including floating workshops, engineering and boilermaking tools, and stores of all kinds. The further properties of the Company at Canning Town and Greenwich will be offered in May.

Chamber of Shipping.—The annual meeting of this body has taken place, and Mr. C. W. Gordon was elected to the presidential chair and delivered an address. At the dinner in the evening the following gentlemen attended: The President of the Board of Trade, Mr. Sydney Buxton, Lord Mersey, Lord Devonport, Lord Inverclyde, Lord Nunburnholme, Sir Kenneth Anderson, Sir Owen Philipps, Lord Inchcape, and many others interested in the shipping industry.

Thames Steam Boats.—The City Steamboat Company, the owners of these boats, have placed proposals before the Highways Committee of the County Council to pay them an annual subsidy of from £5,000 to £10,000 in consideration of the Company running an adequate service of boats from Greenwich to Kew and that the pier rates be remitted until the scheme be brought into operation. The Committee recommended that both requests be refused, but agreed that the piers should be used by the Company on the same reduced terms as before during the coming season.

The National Lifeboat Institution.—The Committee of Management of this body has met under Lord Waldegrave and the silver medal of the Institution was given with a reward for gallant services performed off Anstruther Harbour

in February. Rewards amounting to £631 were granted for life-saving during the same month. The City of London shows the greatest interest in this public work and at the annual meeting of the branch under the Lord Mayor it was said that a sum of £4,705 had been sent to the parent body by this branch during the year.

MERSEY AND MANCHESTER SHIP CANAL.

(*From our Own Correspondent.*)

WHILE few orders for new tonnage have been placed during the past month, great activity prevails in all branches of work.

Messrs. Cammell, Laird & Co.—In placing orders for the last two additions to their fleet locally, the Isle of Man Steam Packet Co. have shown an appreciation of the possibilities of the Mersey as a shipbuilding centre, which might well be emulated by the great ship-owning community whose craft ply the waters of the globe, making this their home port. The above company's fast summer boat was successfully launched from the Birkenhead Yard on March 11th, being christened *King Orry* by Mrs. Waid, wife of the deputy-chairman of the Isle of Man Co. This is the third vessel to bear this name and also the third vessel built for these owners by Messrs. Cammell, Laird & Co. The *King Orry* will be 312 ft. overall, 43 ft. beam and will have a depth to shelter deck of 24 ft. 9 in. A sea speed of 21 knots is expected from the geared turbines driving twin screws. Nine water-tight bulkheads, together with boats and rafts for the 1,000 passengers and seventy-one of a crew, together with wireless telegraphy and submarine signalling are amongst the special features provided for the security of the service. It is expected to hand her over to the owners about May 1st. H.M.S. *Garland*, torpedo boat destroyer, is expected to be launched about the first week in April. The meat barge *Doon* is receiving her finishing touches and will leave shortly for the River Plate. Alongside the *Christianiafjord* is also fast nearing completion, while the sister vessel, *Bergensfjord*, is expected to be launched about April 6th. With the two P. & O. vessels also on the stocks the yard will be well employed on new work for some time. Repair work has been very brisk of late. The *Royal George* is still engaging the attention of a large number of men, both engineers and shipyard workers. General repairs and overhaul are being carried out on the turbines and machinery, while some idea of the extent of the hull work will be gathered from the fact that the whole of the keel, 200 keel plates and 220 floors are being renewed, together with the contingent work. The Russian steamer *Lapponia* has had extensive bottom damage repairs and new tail shaft fitted. Mr. G. J. Carter, managing director, presided at the annual staff dinner, which was held on March 1st. During his remarks Mr. Carter alluded to the necessity for good fellowship to prevail to ensure efficient working and thus there would and should be no need for strikes.

Messrs. H. & C. Grayson.—Messrs. Grayson have in their hands still another vessel being fitted with oil engines, the *Scandinavia*. The *Earlshall*, recently fitted with auxiliary oil engines, has had extensive spar and deck damage repairs. At Birkenhead the steamer *Merion* has had very extensive damage repairs, while the Eastham Ferry steamers *Pearl*, *Ruby* and *Sapphire* have been supplied with new boilers ready for the season's work. At the Garston works this firm have laid down a lightship to the order of the Trinity House. The various repair yards are busy with general overhaul and repair work.

The Cunard Line.—Due to the straining of the turbine blades of the *Lusitania* while entering Fishguard Harbour recently, it has been decided to remove her from the service until August. The repairs are being effected at the Cunard Works at Liverpool. It has been decided to name the large Cunarder now building at Messrs. Scott's the *Transylvania*, while the vessels building at the same yard for the Canadian service of the Company will be named the *Alaunia* and *Andania*.

Mersey Docks and Harbour Board.—Mr. T. Monk Newell, the newly appointed engineer-in-chief to the board, took up his duties on March 3rd.

Messrs. G. S. Goodwin & Co.—This firm are at present supervising the machinery for a large steamer for Messrs. Larrinaga & Co., of Liverpool, in conjunction with Capt. Ojinaga, superintendent of the fleet. This vessel was recently launched by Messrs. Russell & Co., of Port Glasgow, and is 420 ft. long, 54 ft. beam, with 28 ft. moulded depth, and with a gross tonnage of 5,000. The engines will develop 2,400 i.h.p.

The Mersey Tides.—The Admiralty hydrographer has given notice that exceptional tides may be expected in the Mersey this year. The causes are stated to be (1) the zero of the predictions have been lowered one foot to agree with the zero of the Admiralty charts, (2) the predictions for Liverpool for 1913 are founded on new observations, which show an increased tidal range in the Mersey, probably due to the improvement in the river; (3) that certain long-period tides reach their maximum in 1913.

The Nelson Line.—As referred to elsewhere in this issue, the Royal Mail Steam Packet Co., under the ægis of Sir Owen Phillips, has acquired the Nelson Line of steamships. This is of special interest locally, since three vessels of the ten newly constructed have been built by Messrs. Cammell, Laird & Co., *viz.*, the *Highland Laddie*, *Highland Brae* and *Highland Piper*.

Canadian Pacific Railway.—Arrangements have been made by this Company to run a service of steamers from Trieste to St. John, N.B., in winter and Quebec and Montreal in summer. This service will be maintained by the *Lake Champlain* and *Lake Erie*. These vessels will be renamed *Ruthenia* and *Tyrolia* respectively, and will carry only second-class passengers. The *Ruthenia*, after extensive alterations, left Liverpool for Trieste on March 1st. The Liverpool service will be maintained by the Empress boats and the *Lake Manitoba*, pending the arrival of their new steamers.

The Mersey Docks and Harbour Board.—After protracted negotiations a system of wireless telegraphy has been arranged between the Bar and Formby Lightships and the dock offices. This system will be available for service messages only and not for commercial use. A new lightship, *Alarm*, has recently been received and will be placed by the board one mile further out than the present Bar lightship. The position of the present lightship will be occupied by a bell and light buoy.

Giant Liners of the Future.—It will be of interest in view of the return of the *Olympic* to active service, together with the early advent of the *Imperator* and *Aquitania*, to note that larger vessels will at once be laid down. Southampton is spending £100,000 to deepen the approach from the sea. While the *Olympic* has a gross tonnage of 45,000 the *Aquitania* being credited with a gross tonnage also of 45,000, the *Imperator* is about 52,000 tons, the *Britannic*, building at Belfast, is to be about 50,000 tons, while a vessel of 58,000 tons is now under construction in Germany.

NORTH-WEST OF ENGLAND.

(*From our Own Correspondent.*)

Barrow-in-Furness.—Even more activity than has been previously reported is to be seen at the works of Messrs. Vickers, Ltd., at Barrow, where a very great programme of work is in hand, and where there are prospects of a very big future business accruing so soon as the firm is in a position to book orders which are now on offer or likely to come the way of Barrow if the local firm is in a position to undertake them. For some years past the firm has been busy in making extensions to their works with the view of enabling them to turn out more and more work, and the same policy is being followed to-day. As the works have been made more and more complete other developments have suggested themselves to the firm, and these have been undertaken with a good spirit, seeing that at the end there will be all the more facilities of turning out good work economically and at the same time with the utmost celerity. Vast extensions have been decided upon recently, all of which make the firm more independent of help from outside sources, and to-day it is a fact that Vickers, Ltd., have more resources within themselves than any other firm in the world. Further, they are in possession

of the smartest system of organization known in the shipbuilding and engineering world to-day. This system enables them to dovetail the products of the several departments in a time table which helps progress in the construction of ships or engines so that undue delays are avoided, but the rush of orders of late has congested work to a considerable extent, and the firm is now busy on more orders than has ever been in hand at one time before.

Labour Difficulties.—The greatest difficulty Messrs Vickers, Ltd., have at present is that of labour unrest. Many advances in wages have been made to workmen in various departments, and new demands continue to arise almost every week, yet the firm are engaged on contracts taken on the basis of the wages which have been paid for some time past, and thus there is a narrowing of profits to the masters, but the urgency of the demand for delivery of ships and engines make it necessary to give the men fair remuneration for their work, and every effort is being made to prevent possible strikes. The question of overtime in the shipbuilding and engineering branches has been brought to the front of late, and the men have, in the shipbuilding department, decided not to work any more overtime, and in several branches of the engineering trades the same conclusion has been arrived at. The firm have, therefore, started a double shift in the black squad, and it is expected by this means they will be able to make the progress in the work on hand up to the conditions laid down when the orders held were accepted. So far as the engineers are concerned overtime has been worked in that department for a long time past, and it is now necessary to put on additional men, so as to keep pace with the vast amount of work in hand. This employment of additional hands is made somewhat difficult by the fact that house accommodation in Barrow is very scarce, and homes for men to live in will not be available for some months, although building schemes have been adopted, which will supply during the summer houses for at least seven or eight hundred workmen. The building trade of Barrow is, therefore, very brisk, and is likely to continue so for two or three years.

New Orders.—Messrs. Vickers, Limited, have received during the month two small orders. One is for another section of the Brazilian floating dock delivered at Rio de Janeiro a year or two ago, and the second is for a pair of dock rates for the graving dock at Barrow. The latter has been found to be necessary owing to decay of the old gates which have been in use for the past 45 years, and the former has been rendered necessary owing to a still larger battleship being built for Rio for the Brazilian Government than the two super Dreadnoughts delivered from Barrow and Elswick lately. Such a dock when lengthened will be one of the largest in the world, and will be useful for big ocean liners which might want repairs in that quarter of the globe.

Progress of Work.—Much more satisfactory progress is being made with the orders in hand than has been possible of late. The British battleship *Delhi*, which has not been advanced as much as the Admiralty were desirous of, is now making satisfactory headway, but delays have arisen alike because of the scarcity of workmen and the refusal of the men to work overtime. More men are being obtained, and as many of those working have not been making more than 38 hours a week, the firm have offered a premium to those who put in most hours, and this is having a salutory effect. Then the employment of double shifts is also expediting the progress of the work. On the engineering side some of the branches have decided not to work overtime, but this does not affect the members of the Amalgamated Society of Engineers nor the Steam Engine Makers' Society, who are bound by the Carlisle agreement. There is also progress being made with the construction of the Turkish battleship *Reshad V.*, and with the three Brazilian monitors, one of which is almost ready for launching. The launch of the Turkish battleship will not take place until some time in May.

Submarines.—Very great activity prevails in the submarine department, where a considerable number of orders for the Admiralty are in hand, mostly of the E class, but a new departure in the F class now in progress is destined to prove one of the most formidable of the submarines yet built. Particulars of this vessel are, of course, being kept very secret, but it is reported she will be able to go across the Atlantic and to carry means with her to sink the biggest battleships afloat.

BELFAST.

(*From our own Correspondent*)

Messrs. Harland & Wolff have two large steamers nearly ready for launching from the south end of their yard. These vessels will be put in the water within the next few weeks. The *Olympic* is receiving finishing touches preparatory to leaving the port after completion of the extensive structural alterations which have been carried out, and before these notes are in print she will have sailed for Southampton. In addition to the work at her hull, the most notable feature of which has been the providing of an inner skin to a height above the water line for the greater part of the vessel's length, other important improvements and alterations have been carried out. The boats with which the *Olympic* was originally provided are carried under Welin Quadrant Davits, and twelve additional boats have been fitted, which are also handled by the same make of davits. Then, further boats are stowed inboard and nested under some of the outboard boats, so that the leviathan is now fitted out with sufficient life-saving craft to cope with any emergency. But the main fact to be borne in mind is that the vessel herself has been made practically unsinkable. Messrs. Harland & Wolff have completed negotiations with the Harbour Commissioners for the rental of an additional piece of land for extension of their engine works. The ground to be acquired has an area of about fifteen acres and lies immediately at the back of the existing engine works.

Messrs. Workman, Clark & Co. will shortly launch a large steamer named *Tenadores* from their North Yard. At the fitting-out wharves they have the new Holt liner *Nestor*, and the fruit steamer *Patia*. Both these vessels are almost ready for sea. All berths in the North and South Yards are occupied, and they will launch several vessels of importance within the next few months. There is every prospect of this firm being once more near the top of the tonnage output list when the figures for 1913 come to be published.

THE BRISTOL CHANNEL.

Cardiff.

AFTER the chaos produced last month by reason of the severe fogs delaying tonnage, there was an enormous influx of steamers at the various Bristol Channel ports. Dry docks and ship-repairing establishments were well booked up, and there is every evidence of a busy time being experienced for some time to come. At one period there were over forty steamers in Bristol Channel dry docks (more than half being in Cardiff), besides a large number booked for repairs on arrival. There was also a large amount of repairs being executed on boats in the wet docks. A difficulty was experienced in getting a sufficient supply of skilled artisans to cope with the rush of work. The heavy arrivals of tonnage created congestion at the docks in the early part of the month, the trouble being that there were not enough tips to meet the requirements. The railway and dock sidings were also blocked with loaded coal waggons which had accumulated during the foggy weather when shipments were restricted. Many collieries were compelled to stop work owing to a difficulty in obtaining empty waggons. However, when the docks got into full swing again, that difficulty was speedily removed.

Mountstuart Dry Docks, Ltd.—The three large dry docks of this Company have been kept working at high pressure during the month, and there has been a constant succession of steamers at the jetty and dock entrance undergoing overhaul. The chief items of the month's work are the s.s. *Queenmoor* and s.s. *Saint Bede*, both with heavy bottom damage; s.s. *Craigforth*, s.s. *Craigard* and Portuguese mail steamer *Beira* undergoing extensive general repairs, and s.s. *Cornelia* getting new stern frame and stem. Two motor barges for Spillers & Bakers, Ltd., Cardiff, are also nearing completion.

The Channel Dry Dock, Bute Dry Dock and Mercantile Pontoon have all been well engaged during the month, both on repair work and ordinary dry-dock work.

The Steam Pilot-boat Co., Ltd.—A movement was started some time back to replace the present service of sailing pilot

cutters by a steam service. The project was rapidly developed, and a company was formed to furnish the necessary capital for purchasing boats, etc. The first boat purchased was the steam yacht *Waterlily*, which arrived here about the beginning of January. She is a most serviceable looking craft and was originally built for use in the Polar regions where exceptional strength is the first consideration. Her hull is a combination of English oak frames, American elm bottom, and teak sides. She has a lead keel weighing over 11 tons assisting her stability. Her dimensions are length 110 ft., beam 25 ft., draught 13 ft. She is fitted with compound surface-condensing engines of large size and strong construction, an independent centrifugal pump for circulating surface condenser, a general service pump and an evaporator for the production of fresh water for boiler-feed or ship use. The boiler is of the water-tube type working at a pressure of 120 lbs. per square inch. The whole of the machinery department is very conveniently and compactly arranged, and the boat should develop a satisfactory speed when required. The living accommodation for the pilots and crew is roomy and comfortable, and consists of a smoke-room, captain's room, and galley in a deck house amidships, dining saloon and five state rooms reached by a stairway from smoke room, and accommodation for engineers, etc., aft. She is schooner rigged and fitted with steam steering gear, steam windlass with a novel attachment for quick hoisting of boats, also two lifeboats and two boarding boats. Her total complement will be 22 men, including pilots. Her name has been changed to *Edmund Handcock*, in honour of the chairman of the Pilotage Board. The second boat purchased was the steam yacht *Ros Marine*, which arrived here during the month. She is built of iron and, like her companion, is schooner rigged. Her dimensions are length 113 ft., beam 20·5 ft., draught 11 ft. She is fitted with triple-expansion surface-condensing engines, all the necessary pumps being driven off the main engines. There is also a general service pump fitted. The boiler is of the ordinary marine return-tube type, working at a pressure of 140 lbs. per square inch. The living accommodation is rather more roomy than in her companion, and is conveniently and comfortably arranged. It is on much the same lines as that of her consort, with the addition of a piano in the saloon and a chart-room on deck. She is fitted with a steam windlass, steam winch aft for boat-hoisting purposes, and powerful screw steering gear aft. Her name has been changed to *W. W. Jones*, out of compliment to the vice-chairman of the Pilotage Board. It is the intention to purchase two more boats to make the service complete, and to provide for the contingency arising when any of the boats may be obliged to dock for repairs. The service is expected to be in operation by June.

Visit of an Austrian Liner.—The Austro-American liner *Polonia* (ex-*Batavia* of the Hamburg-American Line) visited this port during the month en route from Hamburg to Trieste, her home port. She is intended for the New York emigrant and second-class passenger service, and is of about 11,000 tons. She is fitted with two sets of quadruple-expansion engines driving twin screws, two single-ended boilers and two double-ended boilers of the Scotch marine type. Her engine-room is extensively equipped with auxiliary machinery, including two dynamos and CO_2 refrigerating machine. A large dynamo is also installed in the 'tween decks for use in emergencies. All the machinery, like the ship, is of German make. The sea speed of the ship is 13 knots, the complement of passengers being 280 second-class and 2,600 third-class, and the crew numbering 200. A liner of this type is seldom seen at Cardiff.

Penarth and Barry.

Alarming Accident at Penarth.—A singular accident, fortunately unattended with damage to life or limb, occurred recently at Penarth Dock. The Belfast steamer *Lord Antrim* in the course of proceeding to sea stopped in the locks in order that a spare propeller shaft, weighing about 7½ tons, might be hoisted on board. The shaft had been lifted by a derrick on the mast, and when over the hatch the stay supporting the mast suddenly gave way without warning, with the result that the mast broke near the deck and precipitated the shaft into the hold, where it crashed through the ballast tank top, the mast falling across the ship. The steamer was taken to Cardiff where the damage, amounting to well over £1,000, was repaired by Messrs. Thomas Diamond and Co.

There has been a good volume of repair work lately at Penarth, both pontoon and slipway being kept fairly busy. The past year's trading of this Company has been very satisfactory, justifying the large expenditure recently made in order to bring the concern to the front rank of modern ship repairing and dry-docking establishments.

At Barry exceptionally good business has been done by the Barry Graving Dock Co., and the other establishments have been actively employed on general repairs.

Lloyd's Register.—Mr. W. Pitt, of Manchester, has been appointed to succeed the late Mr. W. Darling as chief surveyor at Barry Dock. Mr. H. S. Ireland, who has been on the staff at Barry Dock for the past seven years, has been promoted to Newcastle-on-Tyne, and will leave Barry shortly.

Newport.

Messrs. Mordey, Carney & Co.—Mr. Wedgwood Vaughan, of Blyth, has been appointed general manager of the ship-repairing business of Messrs. Mordey, Carney & Co. Cardiff, and Newport. Mr. Vaughan has spent the last eight years as assistant manager at the Blyth Shipbuilding and Dry Dock Co., and brings to South Wales an extensive and practical knowledge of all branches of the ship-repairing business. He took up his new position on March 1st.

The Channel Company and the Tredegar Dock were well employed during the month, and are well booked for repairs to expected arrivals.

Bristol and Avonmouth.

The large graving dock at Avonmouth has been taken advantage of lately by quite a number of large steamers, and the expeditious manner in which the work has been carried out reflects credit on the firms concerned.

There is quite a boom at present in ship-repairing at the City Docks, operations having been commenced on the pleasure steamers, for a large number of which Bristol provides very convenient winter quarters.

Swansea.

The Unpronounceable Yacht.—Mr. Godfrey Williams' yacht, *Y Ddraig Goch* (Red Dragon), the latest addition to the Royal Yacht Squadron, has arrived here from Belfast. She is a four-masted fore-and-aft schooner-rigged craft, and is fitted with a type of engine using gas made from anthracite coal.

The dry docks here have been fairly well employed during the month, a big job just completed having been the overhaul of the s.s. *Poplar Branch*, 10,000 tons, one of the largest steamers trading here.

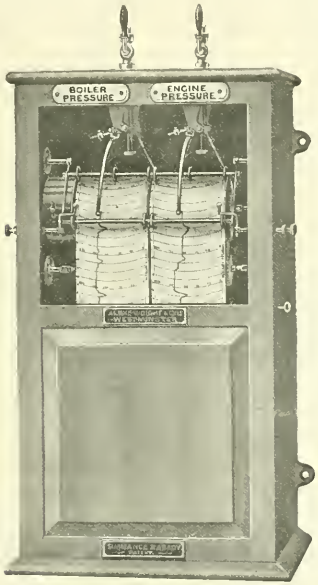
RAMSAY'S MARINE ENGINE GOVERNOR.

THE Ramsay anticipating marine governor described and illustrated in our November issue, has met with very considerable success since being placed on the market. We are informed that orders for governors have been received from the Holland America Line, Union Steamship Company of New Zealand, Booth, City, Shamrock and other lines, from Messrs. Evan Thomas, Radcliffe & Co.—who have ordered four governors—Messrs. Stewart and Esplen, Bowles and others. The Liverpool Patents Co., Ltd., of Liverpool, have been appointed sole selling agents.

The *Edith Callaghan*. A steel tug for Buenos Aires, built by Mr. Edward Hayes, of Stony Stratford. (See Trial Trips.)

RECORDING INSTRUMENTS.

THE useful service which may be rendered by recording instruments has become more fully recognized during recent years, more so in land than in marine installations. Papers and discussions with demonstrations have, however, familiarized marine engineers with several types of instruments and their adoption by a few steamship companies has followed. The Technical Colleges and progressive engineering schools have aided in emphasising the value attaching to instruments designed for the purpose of showing where faults lie or where inefficiency dwells. The tantalising drop in steam pressure at the beginning of the watch and occasionally during the watches is an experience which a recording instrument will tend to minimise by showing clearly the fluctuations by ocular demonstration. In combination with the steam pressure, the water level in the boilers is sometimes a *casus belli* at the relief of the watch and the junior usually suffers hardship unjustly, when the sense of honour on the part of his senior is not so pronounced



Marine Steam Pressure Recorder
(Duplex Type).
Simmance & Abady's Patent.

as it ought to be. The instruments brought under our observation do not however, record alterations as to water levels such are entered up elsewhere. Recent steamers, which we are informed have been fitted with steam pressure recorders, shown on the accompanying illustration, are the *Lusitania*, *Royal George* and *Royal Edward*, while the *Empress of Russia* and *Empress of Asia*, now building at the Fairfield Yard, Glasgow, are in course of being fitted. The duplex instrument indicates on a continuous roll the boiler pressure and the engine pressure, the single type indicates one pressure only on the roll. The roll is long enough for a sixty days run. The case containing the recorder is about 30 in. high by 15 in. broad by 7 in. deep. The clock which works the movement of the chart is an eight-day one. The recording instrument for the forced draught air pressure is made by the same firm, also a new type of steam pressure indicator with improved and more reliable operating mechanism, saving the expense frequently attendant on the ordinary steam gauge re-adjustments when testing safety valves to a standard gauge. The instruments for testing the efficiency of electric lamps are also of considerable service in the economy of the engine room for the purpose of indicating the true value of the lamp compared with its face value. A Calorimeter to test the calorific value of coal supplied at the various coaling ports is another useful apparatus not usually provided in the outfit of a steamer, yet occasionally one finds a home-made apparatus in use by the chief engineer whose records from port to port and voyage to voyage assist him in his reports, although the values may not be quite so accurate as when taken by a highly finished instrument. The illustration is taken from a catalogue of Messrs. Alex. Wright & Co., Ltd., of Westminster, S.W., whose agents are Messrs. Ferguson & Timpson, 104, Minories, London, E.C., to whom we are indebted for the opportunity of showing the instrument for recording steam pressure.

THE GALUSHA SUCTION GAS PRODUCER.

IN a recent issue (October, 1912) we drew attention to the use of gas from coal as a fuel for internal combustion engines, and in the article gave some illustrations of engines and producers which had already been in operation long enough to prove the reliability of this source of power. If further proof of the reliability and economy of this sort of power were necessary it would be sufficient to point to the large number of boats which have been fitted out and to the repeat orders which are coming in for this combination.

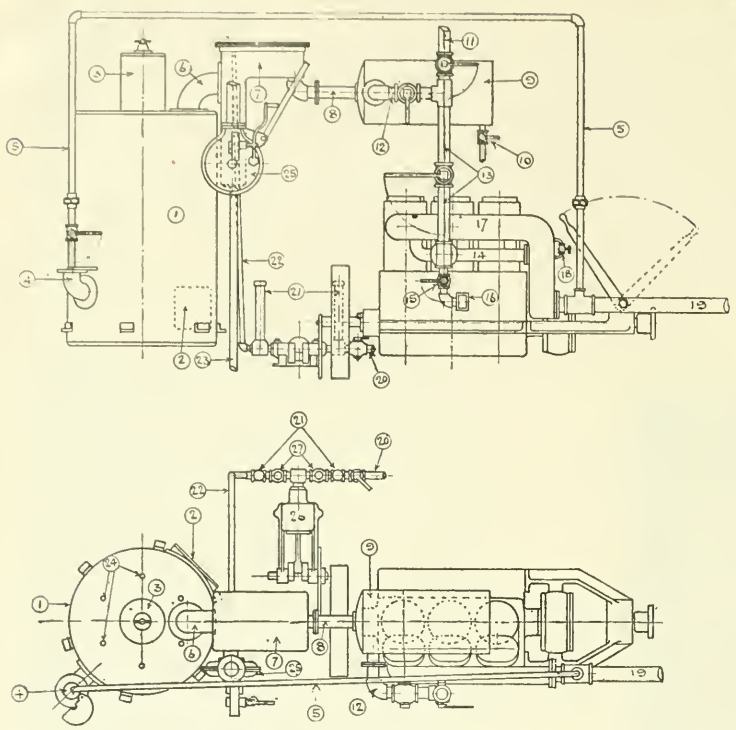
Our readers will remember that one of the combinations mentioned was a "Wolverine" Engine and a "Galusha" Suction Gas Plant. We are now in a position to give a drawing and a description of a typical set composed of these two units.

To those who are unfamiliar with the action of suction gas producers, a description of the process of gas making and the machine in which that process is carried out will help to make the drawing more intelligible. The gas producer is commonly cylindrical in shape and the outer casing is iron It is divided into three compartments. The lowest of these is an ashpit, in which, near the bottom, in the side at some convenient place there is a door for the extraction of ashes Above the ashpit there is a fire grate to carry the fuel, and the chamber above the firebars is lined with fire-brick, or some other refractory material. On the very top of the producer there is a hopper which has a valve at the top and another between the hopper and the top of the producer proper. These valves are generally arranged so that one is shut while the other is open.

The action of coaling is performed in this manner:—The valve between the hopper and the producer is closed, and the valve which permits fuel to be put into the hopper opened. Fuel is then put into the hopper, and the filling valve of the hopper shut. On opening the communicating valve, between the hopper and the producer, the fuel is admitted into the producer. Below the fire-bars there is an opening to admit air and a certain quantity of steam to the fire, and these are controllable so that the amount of air and steam may be regulated to suit requirements. At the top of the producer there is an outlet for the gas to leave the producer when it passes through scrubbers and cleaners, which will be dealt with shortly. A small suction fan discharging to the atmosphere, and having a shut-off valve, is fitted for starting gas making. This fan is operated by hand.

The process of gas making is commenced by lighting a fire of wood and small coal on the top of the fire-bars, and when this has got well started, putting a quantity of coal on, until there is a large quantity of burning fuel. The anthracite, coke, or charcoal fuel is then filled into the producer through the hopper, and having closed all ashpit doors, etc., the suction fan is started and begins drawing up the fire, discharging the products of combustion to the atmosphere. As the fire in the producer burns up more fuel is added, if necessary, and, after a comparatively short time—about half an hour—there should be a good body of incandescent fuel upon the top of the fire-bars, with a superimposed body of green fuel.

There is in suction gas producers some means of vaporising water, nearly every make of producer having a different



Explanatory List of Numerals.

1.—Producer
2.— ,, Ashpit Door.
3.— ,, Fuel Hopper
4.— ,, Air & Vapor Inlet.
5.— ,, Vapor Inlet from Exhaust
6.— ,, Gas Outlet to Scrubber
7.—Scrubber.
8.— ,, Gas Outlet to Expansion Tank.
9.—Expansion Tank
10.— ,, ,, Drain Cock.
11.—Air Inlet and Regulating Cock for Engine.
12.—Gas Inlet and Regulating Cock for Engine
13.—Air and Gas Mixture and Regulating Cock for Engine.
14.—Air and Gas Mixture Inlet Manifold on Engine.
15.—Petrol Starting Throttle Cock
16.— ,, ,, Carburetter
17.—Engine Exhaust Pipe
18.— ,, Jacket Water to Vaporiser.
19.— ,, Exhaust Overboard
20.—Scrubber Pump Suction and Cock
21.—Scrubber Pump Air Vessels.
22.— ,, ,, Discharge to Scrubber,
23.—Drain from Scrubber.
24.—Poke Holes.
25.—Suction Fan for Starting Gas Making.
26.—Scrubber Pump
27.— ,, ,, Check Valves

Galusha Marine Gas Producer and Wolverine Engine.

system, or, if the same system is adopted the details of the design are widely different. In all types, waste heat is utilised for forming steam from water. This waste heat may be contained in the gases as they leave the producer, or it may be contained in the exhaust from the engine. Whichever system is adopted the steam, after it has been formed, is led along with the air which is supplied for combustion and introduced to the producer below the fire-bars. The various chemical actions which take place are practically speaking the combination of oxygen with carbon and hydrogen with carbon. As the entering air and water vapour meet the unconsumed fuel, part of the oxygen of the air combines with the carbon of the fuel to form carbon dioxide (CO_2), and part to form carbon monoxide (CO). This of course means that part of the fuel is completely burnt, and another part only partially burnt, and capable of being burnt or of giving out heat at some later stage. The water vapour meeting the unconsumed carbon of the fuel is split up into two constituents, two parts of hydrogen and one of oxygen (H_2 and 0). Most of the hydrogen combines with the unconsumed carbon to form marsh gas (CH), some of the hydrogen combines with the free oxygen and helps to maintain the heat of combustion; the greater part of the oxygen combines with the carbon to form the major portion of the carbon monoxide, which is present in the gas as it is finally drawn off by the engine. Naturally all the nitrogen which is present in the air which is supplied to the producer passes over to the engine and is useless for any power purposes.

If the diameter of the producer is small for the amount of gas which is made the velocity of the gas is naturally high in passing through the producer and particles of dust will be carried over along with the gas to the engine, choking up the scrubber in passing over; some of it will be deposited in the scrubber, that which is carried over from the scrubber cutting up the valves, piston and cylinder of the engine. The small diameter of the producer, and the consequently high velocity of the air through the fire causes the temperature of the fire to become very high, which forms clinkers on the fire-bars, and the inside of the producer. The clinkers round the inside still further reduce the area, and this reduction of area accentuates the trouble. The high velocity of the gases through the fuel causes holes, or vents, to form in the fuel above the combustion zone, and this has the effect of upsetting the chemical actions which should be carried out there, with the result that the gas manufactured is of an inferior quality. The excessive heat of combustion may be defeated to some extent by introducing more water vapour, thereby reducing the temperature of the fire and increasing the calorific value of the resulting gases. The vents may be closed by consolidating the fuel by means of a "poke-bar," introduced through suitable orifices on the top of the producer. While the introduction of water vapour and the frequent use of the "poke-bar" to a certain extent cures the trouble referred to above, they have certain drawbacks. With excessive water vapour, so long as a constant load is maintained, all goes well, but when the load is reduced the excessive amount of water and the reduced suction of the engine cools the fire to such an extent that when there is a sudden demand for an increase of power there is difficulty and in some cases an impossibility of meeting this demand.

Similarly, consolidating the fuel by frequent applications of the "poke-bar" means constant attention, and one of the great arguments in favour of suction gas for marine use is the little attention which the producers should require. One of the points of the Galusha suction Gas Producer is the more than liberal diameter which is supplied for a given H.P., thus meeting all the objections mentioned above in the only satisfactory manner, although at a slightly increased first cost. In the long run, however, it will be found that this is well-spent money, owing to the reduction in supervision and upkeep charges.

A very important point in producers is the lining. Should a fire-brick lining crack air penetrates from the outside, because, it must be remembered, this machine is constantly below atmospheric pressure, owing to the engine drawing off just so much gas as it requires; consequently if air leaks in the working and manufacture of the gas is interrupted the result is poor gas. In the producer under consideration a special brick is used. They are comparatively small so as to heat evenly all through and avoid cracking through uneven expansion. They are fitted together on a tongued and grooved system which prevents them from sticking out here-and-there and forming shelves for ash and clinker. Between the fire brick and the outside shell there is a special insulating material. This insulating material is a special compound which does not shrink when dry, but hardens and consolidates, preventing the passage of air.

In most suction gas plants the scrubbers and washers are of abnormal size, and it is one of the features of the Galusha Plant that the scrubber is comparatively small.

It is interesting to note that with this type of plant salt water or impure water may be used. The scrubber is filled with small coke and has a spray of water playing over the top of it. The water percolates and drops through and between the pieces of coke and the gas passing upwards gets thoroughly washed and scrubbed, leaving behind it all impurities, which in turn are carried off by the water through the drain from the scrubbers. Between the scrubber and the engine there is an expansion tank or chamber. This chamber is of great advantage in allowing the gas to settle or deposit any moisture or dirt which may be carried over from the scrubber. It also equalizes the flow of gas, acting as a reservoir should the engine suddenly be speeded up, and as a holder should the engine be slowed down. The drawing which we reproduce will give our readers an idea of an installation which has been well thought out and has proved successful in a number of marine installations.

OBITUARY.

Henry Murray.

WITH regret we put on record the death of one of the well-known shipbuilding employers of the lower reaches of the Clyde, viz., Mr. Henry Murray, the head of Messrs. Murdoch & Murray, Ltd., Port Glasgow. His demise took place in his 76th year, after some months of comparative retirement from active business, on March 20th, at his private residence of Westfield, Port Glasgow. Born in Paisley in 1838, he received his education in that town and was early apprenticed to the trade of a joiner. When about 25 years of age he secured a situation in the saw-mill works of Messrs. Blackwood & Gordon, Port Glasgow. After working with this firm for some time, he, along with Mr. James Crawford and Mr. Hugh Paton, commenced the business of shipbuilding in iron under the name of Henry Murray & Co., in the yard at Kingston, now very much extended and occupied for many years by Messrs. Russell and Co. After the firm of Henry Murray & Co. had been in existence for ten years, Mr. Murray severed his connection with it and in 1872, along with Mr. James Murdoch, he started the firm of Murdoch & Murray, in the yard at Port Glasgow. Mr. Murdoch retired eighteen years ago, but Mr. Murray took an active interest in the affairs of the firm practically until his death. The firm built no fewer than seventy steamers for passenger and cargo trade on the river Amazon. Mr. Murray, who was one of the oldest shipbuilders on the Clyde, was a considerate employer and much respected by the workmen. Deceased took an active part in the affairs of the industry and at one time was chairman of the Clyde Shipbuilding Association. He took a great interest in the operating of the Workmen's Compensation Act, and had been a member of the local committee of the Iron Trades Employers' Assurance Company, Ltd., of which Company he also had been a director from its inception. He was a director of the North-Western Rivet, Bolt and Nut Factory, Ltd., Airdrie, but owing to failing health he retired about a year ago from these directorships. Deceased is survived by three sons and three daughters all married. Two of the sons, James and George are members of the firm, while the third, Mr. John Murray, is a partner of Messrs. Murray, Macnab & Co., shipowners, Glasgow.

LAUNCHES AND TRIAL TRIPS.

LAUNCHES—English.

La Negra.—There has been launched from the Hebburn shipyard of Palmers Shipbuilding & Iron Co., Ltd., the large twin-screw insulated steamer *La Negra,* built to the order of Messrs. Furness, Withy & Co., Ltd., for the British and Argentine Steam Navigation Co., Ltd. This vessel is one of four constructed for the frozen and chilled meat trade, and is to take her place in the fortnightly express service of steamers between the River Plate and Liverpool which has been inaugurated by Messrs. Furness, Withy & Co. The service alternates with a fortnightly service inaugurated by the Royal Mail Steam Packet Company, thus providing a direct weekly service. These vessels are the largest meat carriers yet constructed, having an insulated capacity of about 420,000 cubic feet; the whole of this space is fitted both for the carriage of chilled or frozen meat. The *La Negra* is 460 ft. in length by 59 ft. beam by 38 ft. 1 in. depth. She is fitted with four complete decks all fore and aft, with a bridge over the shelter deck 140 ft. long and a boat deck above this. The vessel has nine steel water-tight transverse bulkheads extending to the shelter deck, which, with the various decks, divide the vessel into 26 compartments, 20 of these being insulated throughout. Wireless telegraphy has been fitted. Accommodation for a limited number of first-class passengers is provided in a deckhouse on the fore-end of the bridge deck and boat deck, with a handsome roomy saloon. The first-class smokeroom is situated directly above the saloon. Quarters are provided for about 400 emigrants. The propelling machinery, which has been constructed by Palmers Company at their Jarrow Works, consists of twin screw triple-expansion engines, with cylinders 25, 41½, and 70 in. by 48 in. stroke, with six large boilers. The engines are designed for a high rate of piston speed. The propellers are of the built type, with manganes bronze blades.

Emerald and Margaret Duncan.—On February 8th, there was launched from the yard of Messrs. Cochrane and Sons, Ltd., shipbuilders, Selby, a steel screw trawler, the principal dimensions being 133 ft. 4 in. by 23 ft. by 13 ft. moulded. The vessel has been built to the order of Messrs. The Kingston Steam Trawling Co., Ltd., Hull, and will be replete with all the latest improvements for the fishing trade. She will be fitted with powerful triple expansion engines by Messrs. C. D. Holmes & Co., Ltd., of Hull. The vessel was christened *Emerald.* On February the 10th there was launched from the same yard a steel screw trawler, the principal dimensions being, 120 ft. by 22 ft. by 12 ft. 4 in. moulded. The vessel has been built to the order of Mr. John Duncan, of Liverpool, and will be replete with all the latest improvements for the fishing trade. She will be fitted with powerful triple expansion engines by Messrs. C. D. Holmes & Co., Ltd., of Hull. The vessel was christened *Margaret Duncan.*

Nordmark.—On February 11th, Messrs. Wm. Doxford and Sons, Ltd., launched from their yard at Pallion, Sunderland, the s.s. *Nordmark,* built to the order of Messrs. The Hamburg-Amerika Linie, Hamburg. The dimensions of the vessel are:—Length, 434 ft.; breadth, 54 ft. moulded; depth, 29 ft.; deadweight capacity, 8,850 tons. Messrs. Doxford are supplying the engines and boilers, and have also a sister ship in hand for the same owners. Classification is with Lloyd's in their 100 A1 class. During construction the vessel has been superintended, on behalf of the owners, by Mr. C. Hatje and Mr. Waak.

Dartwen.—On February 19th, Messrs. Richardson, Duck and Co., Ltd., launched from their yard a steel screw steamer of the following dimensions, *viz.*:—Length overall, 304 ft.; breadth extreme, 51 ft.; depth moulded, 30 ft. 4 in.; gross tonnage about 4,800 tons. This vessel, which has been built to the order of The W. & C. T. Jones Steamship Co., Ltd., of Cardiff, will class 100 A1 in Lloyd's Register, and has been built under special survey. She is of the single deck type, and has cargo poop, bridge amidships, and topgallant forecastle for crew, accommodation for captain, officers, and engineers being fitted up in steel houses on bridge deck. A cellular double bottom throughout and peak tanks are fitted for water ballast, and equipment includes seven steam winches, winch condenser for dealing with exhaust steam with separate circulating donkey, horizontal multitubular donkey boiler, steam windlass with quick warping ends, fourteen derricks, stockless anchors, steam steering gear, etc., etc. The engines by Messrs. Blair & Co., Ltd., have cylinders 26 in., 42 in. and 70 in., with a stroke of 48 in., steam being supplied by three single-ended boilers having a working pressure of 180lbs. The hull and machinery have been constructed under the supervision of Mr. Geo. W. Wilson, owners' superintendent engineer.

Dilston.—On February 20th, the Blyth Shipbuilding and Dry Docks Co., Ltd., launched from their Shipbuilding and Graving Docks Works the fine steel screw steamer *Dilston*, being the seventh vessel built by this firm to the order of Messrs. John Ridley, Son & Tully, of Newcastle-on-Tyne. This vessel, which measures 255 ft. in length, with a beam of 37 ft. 3 in., has been constructed under Lloyd's Special Survey for their highest class. She is of the raised quarter deck type, having short bridge and topgallant forecastle. The accommodation for the captain is in the bridge, and for the officers and engineers in sidehouses on raised quarter deck, whilst the crew will be berthed in topgallant forecastle. The *Dilston* is specially adapted for the coal and wood trade, having extra large self-trimming hatches and clear holds, together with the best and latest design of deck machinery for the quick and economical working of the cargo. Triple expansion engines of good power will be supplied by Messrs. The North Eastern Marine Engineering Co., Ltd., of Sunderland. The ceremony of naming the vessel was daintily performed by Mrs. Tully, wife of J. E. Tully, Esq., of West Quarter, Hexham. An adjournment was afterwards made to the offices of the shipbuilders, when the success of the *Dilston*, her owners, and other toasts were honoured. During construction the hull and machinery have been under the supervision of Messrs. Jos. R. Scott & Son, of Newcastle-on-Tyne.

Candelaria.—On February 20th, Messrs. W. Harkess and Son, Ltd., launched from their shipbuilding yard at Middlesbrough the steel twin screw steamer *Candelaria*. This vessel has been built to the order of Messrs. John M. Campbell & Son, Glasgow, for Brazilian owners, and is specially designed for the timber trade on South American rivers and coast. Her dimensions are 205 ft. by 40 ft. by 11 ft. 3 in. moulded; she is built to Lloyd's highest class for Brazilian coasting, and fitted with heavy deck machinery for handling heavy logs. She has large hatchways and large cubic capacity, and will carry about 1,100 tons on a very light draft. Her engines are being fitted on board by Messrs. MacColl & Pollock, Ltd., of Sunderland, and will drive the vessel at a speed of 10 knots loaded.

Iossifoglu.—On February 20th, Messrs. Robert Thompson & Sons, Ltd., launched from their Southwick Yard a first-class finely modelled cargo steamer, built to the order of S. Iossifoglu, Esq., of Athens. Her principal dimensions are: Length overall, 361 ft.; breadth, 50 ft.; depth moulded, 25 ft. She takes the highest class at Lloyd's, bridge amidships 210 ft. long, and topgallant forecastle, where the crew are comfortably berthed. Ample water ballast is provided in the cellular bottom and in fore and after peaks. Accommodation is arranged for the captain, steward, and spare berth, in a large steel house at the fore end of the casing, the dining room, etc., being tastefully fitted up in mahogany. The chart room, with an office for captain adjoining, and wheel house, is fitted above this house, under the upper flying bridge. The officers and engineers, with messroom, bathroom, etc., are situate in steel houses abreast the engine casing. There are five large cargo hatchways, having double derricks fitted on tables with crosstrees at masthead, also derrick posts to bridge hatches, all arranged for rapid loading and discharging, and worked by eight powerful steam winches. A large multitubular donkey boiler of ample capacity will supply steam to deck machinery. The vessel is fitted with a complete installation of electric light. The engines, by Messrs. The North Eastern Marine Engineering Co., Ltd., Sunderland, have cylinders 24½ in., 40 in., and 66 in., with a stroke of 45 in., steam being supplied by large boilers at a pressure of 180lbs. per square inch. During construction the vessel and her machinery have been under the personal supervision of Mr. P. N. Embiricos, of London.

Victorian Transport.—On February 21st, the Northumberland Shipbuilding Co., Ltd., Howdon-on-Tyne, launched the finely moulded steamer *Victorian Transport*, which has been built to the order of Messrs. Furness, Withy & Co., Ltd., West Hartlepool, for the Houlder Line, Ltd., London. The vessel is about 400 ft. long by 52 ft. beam by 39 ft. 6 in. deep, of the single deck type, and has been built under special survey to the highest class at British Corporation. She is fitted with long bridge, poop and topgallant forecastle. Accommodation in steel houses on bridge deck. There are ten steam winches by Messrs. Clarke, Chapman & Co., Ltd., a large number of cargo derricks and steam windlass by Messrs. Emerson, Walker & Thompson Bros. The usual water ballast arrangements for light passages are fitted. The machinery will be supplied by Messrs. Richardson, Westgarth & Co., Limited, of Sunderland, consisting of engines with cylinders 25 in., 40 in., 62 in. by 48 in. stroke, three large boilers with 180lbs. pressure. The vessel will carry over 8,000 tons on a light draft and steam about 10 knots loaded at sea.

Noorderdyk.—On February 21st, Messrs. William Gray and Co., Ltd., launched the handsome steel screw steamer *Noorderdyk*, which they have built for The Holland-America Line, Rotterdam. The vessel will take the highest class in Lloyd's Register, and is of the following dimensions: Length overall, 438 ft.; breadth, 54 ft. 6 in.; and depth, 31 ft. 3 in. She is a handsomely modelled vessel of the double deck type with complete shelter deck. The saloon, captain's, officers', engineers', room for wireless telegraphy, and crew's rooms, etc., will be fitted up in a large deck house on the shelter deck. The vessel is fitted with steel grain divisions, and has a cellular double bottom and after peak tank for water ballast, and in addition there is a deep tank or hold compartment fitted for water ballast abaft the engine room giving a total capacity for water ballast of about 2,500 tons. The whole of the outfit, including steam windlass, steam steering gear, 34 Mannesmann tube derricks, one to lift 40 tons, twenty steam winches, two being extra large, exhaust steam to winch condenser, are all of the most improved description. Triple expansion engines are being supplied by the Central Marine Engine Works of the builders, having cylinders 28 in., 46 in., and 77 in. diameter, with a piston stroke of 54 in., and five natural draught steel boilers. A special feature in the boiler installation is the superheater, designed and made by the engine builders with a view of utilising to the utmost the heat from the gases on their way to the funnel, another feature of interest is the "Cmew" type of main condenser, which is designed to give a high vacuum in tropical waters. A special system of "Cmew" auxiliaries, including winch condenser, surface feed heater with oil and air extractor, evaporator and duplex feed and ballast pumps will be installed in the engine room.

Hannah.—On February 21st, there was launched from the yard of The Tyne Iron Shipbuilding Co., Ltd., Willington Quay-on-Tyne, a steel screw steamer built to the order of Messrs. Franz Rahtkens & Co., of Middlesbrough. The vessel is built to the highest class at Lloyd's, and is of the following dimensions, *viz.*:—Length overall about 360 ft.; breadth extreme, 50 ft.; depth moulded, 26 ft. She is built under the single deck rule with poop, bridge and forecastle. Has water ballast fitted right fore and aft on the cellular system, and is also fitted with all modern improvements for the rapid loading and discharging of

cargo including seven double cylindered steam winches, direct acting steam windlass, large patent multitubular donkey boiler, steam steering gear by Messrs. Donkin and Co., with right and left screw gear aft. She is fitted with double derricks to all main cargo holds and has derrick posts on bridge for dealing with the cross bunker hatch and is in all respects an exceptionally good example of the modern cargo steamer. The engines which are to be supplied by Messrs. Blair & Co., Ltd., of Stockton-on-Tees, are of the triple expansion type, having cylinders 25 in., 42 in. and 68 in. by 45 in. stroke, with two large single-ended boilers working at a pressure of 180lbs. Messrs. Wailes, Dove & Co.'s Bitumastic Solution, Bitumastic Enamel, and Bitumastic Covering have been applied to the engine and boiler room tanks, tank tops, and bunkers.

Oosterdyk.—On February 21st, Messrs. Irvines Shipbuilding & Dry Docks Co., Ltd., launched from their Middleton Shipyard, West Hartlepool, the steel screw steamer *Oosterdyk*, being the first of two very fine vessels which they are building for the Holland-America Line of Rotterdam. The dimensions of the vessel are 470 ft. by 55 ft. by 41 ft. 7½ in. depth moulded to the shelter deck, and complete main, upper and shelter decks are fitted, with a tier of strong beams at the lower deck height, and steel grain divisions all fore and aft. She is built to Lloyd's highest class, having bulb angle frames, and a cellular double bottom is fitted all fore and aft for water ballast, together with a deep tank at each end of the engine and boiler space. The vessel is fitted with four masts of sufficient length for the carrying of the aerial wires in connection with a Marconi installation, and a most complete and up to date arrangement of loading and discharging gear is provided, consisting of twenty 7 m. by 12 m. silent running steam winches, together with eight derrick posts and 32 Manesmann steel derricks: in addition to this a 40-ton steel derrick is fitted so as to deal with heavy lifts in either No. 1 or No. 2 hold, a special worm gear winch being provided for working this derrick. A combined steam and hand steering gear is fitted direct on the rudder head, with telemotor attachment amidships, patent direct steam windlass, stockless anchors, four lifeboats, and two jolly boats, providing sufficient boat accommodation on either side of the vessel for every person on board, and a complete installation of electric light, including signal lamps, binnacles, and cargo clusters at each hatch. A special installation is also fitted throughout the holds and 'tween decks, which has been found necessary for effectively handling the valuable cargoes carried by this Company. A special feature of this vessel is that the whole of the accommodation, including the sailors and firemen, is placed in a large steel house on the shelter deck amidships, having a promenade deck over same 150 feet in length. The sailors and firemen are berthed in separate compartments, with large messrooms, wash-places, lavatories, etc., for each department. Accommodation generally for the captain, officers and engineers is fitted in spacious rooms, special attention having been paid to light and ventilation; steam heating is also fitted throughout the whole of the accommodation. A special Marconi room is situated on the shelter deck amidships, complete with silent chamber, etc., and a long distance wireless telegraphy installation is being fitted by the Marconi Company. Ample store room, ice house, etc., are fitted throughout the vessel, together with cool cupboard in the pantry. The machinery, which has been constructed by Messrs. Richardsons, Westgarth & Co., Ltd., Hartlepool, consists of a powerful set of balanced quadruple expansion engines with six large boilers working under natural draught at a pressure of 215lbs. per square inch. The cylinders are 27½ in., 37½ in., 55 in., and 84 in. diameter by 60 in. stroke, each being independent, with receiver pipes of steel and universal expansion glands. The high pressure cylinder is fitted with a piston valve, the two intermediate cylinders with flat balanced valves, and the low pressure with a double ported slide valve, the ports and passages being in accordance with the engine builders' latest practice. Each of the cylinders is supported by two heavy cast iron columns, which are braced together at the top with strong box girders, these also forming supports for the reversing gear. The shafting throughout is of fluid compressed steel, the crank shaft being in four interchangeable parts with webs of special form as required for the system of balancing; the large four-bladed propeller is made entirely of bronze. The condensing and feed heating installation is very complete, and embraces the entire "Contraflo" system as adopted when independent feed pumps are fitted in addition to the feed pumps on the main engines. The system comprises "Contraflo" main and auxiliary condensers, direct contact oil separating feed heater, cascade water filter and thermal receiver and drainage separater, the independent pumps being of the Mumford "Dreadnought" type. An excellent arrangement has been effected in the engine room of the large number of auxiliaries; these, in addition to those forming part of the Contraflo system, include Drysdale centrifugal pump, Mumford auxiliary feed pump float controlled from cascade filter, Mumford's ballast and general service pumps, and combined air and circulating pumps for the auxiliary condenser, also a Morison's surface feed heater and a large evaporator of the vertical radial type. The hull and machinery have been built to the Holland America Co.'s specification, and the contract has been carried out under the supervision of Mr. H. Van Helden, the Company's naval architect.

Trevilley.—On February 22nd, there was launched from the shipbuilding yard of Messrs. John Readhead & Sons, Limited, West Docks, South Shields, a steel screw steamer, built to the order of Messrs. Edward Hain & Son, St. Ives, Cornwall, and named the *Trevilley*. The dimensions of the vessel are: 381 ft. by 51 ft. by 27 ft. 8½ in., and she will carry a deadweight cargo of 7,850 tons on a light draught of water. She is of the improved single deck type, to Lloyd's highest class, and under their special survey, having poop, extra long bridge, and topgallant forecastle, with deep girder framing, and cellular double bottom fore and aft, with large after peak tank for water ballast; holds clear of beams and other obstructions. The outfit of the ship is complete for general and grain trades, with shifting boards all fore and aft, and large hatchways as feeders. A full equipment of steam winches and derricks is fitted for the rapid loading and discharging of cargoes. The vessel will be fitted with triple expansion engines, also constructed by Messrs. John Readhead and Sons, Ltd., having cylinders 26 in., 42 in., and 69 in. with 48 in. stroke, supplied with steam from two large steel boilers working at a pressure of 180 lbs. per square inch. This is the sixty-first vessel built for the above firm by Messrs. John Readhead & Sons, Ltd.

Salamanca.—On February 22nd, there was successfully launched from the shipbuilding yard of Messrs. Wood, Skinner & Co., Ltd., Bill Quay, Newcastle-on-Tyne, a finely modelled steel screw steamer specially built for the Canary Island fruit trade and constructed to the order of Mr. Otto Thoresen, of Christiania, Norway. The vessel is fitted with special water ballast capacity provided in the cellular double bottom and fore and after peak tanks, as well as a complete system of ventilation and all the necessary and latest appliances for facilitating the rapid loading and discharging of cargo, including double derricks of Mannesmann steel tubes, which are provided at each hatch. The saloon and passenger accommodation is in a large deckhouse amidships, with captain's room and chartroom in house above, the officers and engineers being berthed in sidehouses on each side of the engine casing and the crew in deckhouse aft. The propelling machinery will be fitted by Messrs. North Eastern Marine Engineering Company, Limited, of Wallsend-on-Tyne, and will have cylinders 19 in., 31 in., and 51 in. diameter by 30 in. stroke, supplied with steam from two specially large multitubular boilers working at 180 lbs. pressure, fitted with Howden's forced draught arrangement and Schmidt's patent superheaters. Both the hull and machinery have been constructed to the requirements and under the special survey of Det Norske Veritas for their highest classification and under the supervision of Mr. Carl Conradi, of Christiania.

Frederiko Clavig.—On February 22nd, there was launched from the yard of Earle's Shipbuilding and Engineering Co., Ltd., Hull, a finely modelled single screw steamer. The vessel, which is named *Federiko Clavig*, has been built to the order of the Navigazione a Vapore Unione, Dubrovnik, Austria, and is intended for their grain and general trade. The principal dimensions are:

length, 420 ft.; breadth, 54 ft. 2 in.; extreme depth, 28 ft. 11 in. moulded. The vessel is constructed of steel throughout to Lloyd's 100 A1 class, and to the latest requirements of the Board of Trade, including Suez Canal and grain carrying certificates and the new life saving appliances' rules. The vessel is of the single deck type with poop, long bridge, and forecastle erections, and designed for carrying a large quantity of water ballast. On the fore part of the bridge deck a spacious saloon house is erected, in which are situated captain, steward, staterooms, and senior officers' quarters. The engineers and junior officers are berthed in side houses abreast the engine casing and crew in the forecastle. The vessel has two steel masts, and six derrick posts, with an extensive arrangement of derricks and powerful steam winches for the speedy handling of cargo, also an up-to-date steam windlass. The steam steering gear is placed in the engine casing, and the hand steering gear on poop deck. An elaborate system of fire extinguishing apparatus will be fitted to all holds and bunkers. A complete installation of electric lighting has been arranged. The work throughout the vessel is of the very best description, with all the latest improvements.

San Fraterno. The largest oil tank steamship in the world, built by Messrs. Swan, Hunter & Wigham Richardson, Ltd., Wallsend-on-Tyne, for The Eagle Oil Transport Company, Ltd., London. On February 22nd, in the presence of a large and distinguished company, there was successfully launched from the Wallsend shipyard of Messrs. Swan, Hunter & Wigham Richardson, Ltd., an important steamship for carrying oil in bulk. The day was radiantly fine, and as the ship left the ways she was gracefully named *San Fraterno* by Lady Bowring, wife of Sir Thomas Bowring, the vice-chairman of the Eagle Oil Transport Co., Ltd., who was also present, together with his colleagues the Hon. B. Clive Pearson and Captain Godfrey Faussett, R.N. The owners were also represented by Mr. Barringer and his assistant, Mr. Walter Bradney, of Messrs. Jacobs & Barringer, who co-operated with the builders in the design of the steamer; Captain Cox, Mr. E. F. Smart and Mr. John Gray. The *San Fraterno* is 541½ ft. long overall, with a breadth of 66½ ft. She is designed to carry 15,500 tons of oil on a draft of 28 ft., and her speed on a fully loaded trial is to be 11¼ knots. The ship is the largest oil-carrying steamer afloat in the world, though the owners have altogether ten of these great ships under construction, three being built at the Wallsend shipyard. The owners also have a number of 9,000 ton oil-carrying ships being built, some of which are also in the hands of Messrs. Swan, Hunter & Wigham Richardson, Ltd. The *San Fraterno* has been built upon the Isherwood system, with longitudinal framing to the highest class of Lloyd's, under special survey. The oil holds and bunkers are divided into fourteen compartments by transverse bulkheads, and are further sub-divided by a central longitudinal bulkhead which is carried through all the holds, pump rooms and cofferdams. There are two cofferdams five feet in length at each end of the range of oil holds. The quadruple expansion engine and the boilers have been built by the Wallsend Slipway and Engineering Co., Ltd., and will be placed in the after end of the ship, fitted with the Wallsend-Howden patent apparatus for burning liquid fuel. The accommodation for the captain and his officers will be most comfortable, and will be in the bridge house amidships. The engineers' cabins will be fitted in the poop, and close to them will be the crew's quarters. Wireless telegraphic apparatus will be fitted, and it may be said that the *San Fraterno* in every detail of design, in the installation of oil pumps, in the main engines and auxiliary machinery and in all items of outfit, will represent the most modern and approved type of steamship for carrying oil. Messrs. Wailes, Dove & Co.'s Bitumastic Solution and Covering have been applied to the cellular double bottom and tank top.

Volesus.—On February 24th, there was launched from the yard of Messrs. Cochrane & Sons, Ltd., shipbuilders, Selby, a steel screw trawler, the principal dimensions being: 133 ft. 4 in. by 23 ft. by 13 ft. 1 in. moulded. The vessel has been built to the order of Messrs. The Atlas Steam Fishing Co., Ltd., Grimsby, and will be fitted with powerful triple expansion engines by Messrs. C. D. Holmes and Co., Ltd., of Hull.

Pensilva. On March 10th, Messrs. William Gray and Company, Ltd., launched the handsome steel screw steamer *Pensilva*, which they have built for Richard B. Chellow, Esq., Truro. She will take the highest class in Lloyd's Register, and is of the following dimensions: Length over all, 377 ft.; breadth, 50 ft. 6 in.; and depth 28 ft. 4½ in., with long bridge, poop and topgallant forecastle. The saloon, staterooms, captain's, officers', and engineers' rooms, etc., will be fitted up in houses on the bridge deck, and the crew's berths in the forecastle. The hull is built with deep frames, cellular double bottom, and large aft and fore peak ballast tanks, eight steam winches, steam steering gear amidships, hand screw gear aft, patent direct steam windlass, large horizontal multitubular donkey boiler, steam ash hoist, steel grain divisions, stockless anchors, telescopic masts with fore and aft rig, boats on deck overhead, and all requirements for a first-class cargo steamer and Admiralty transport work. Triple expansion engines are being supplied by the Central Marine Engine Works of the builders, having cylinders 25 in., 41 in., and 68 in. diameter, with a piston stroke of 48 in., and two large steel boilers for a working pressure of 180 lbs. per square inch. The ship and machinery have been built under the superintendence of Mr. John Chellow and Mr. Richard Rapsen on behalf of the owners.

Norman Bridge.—On March 11th, the oil-tanker *Norman Bridge* was launched from the Neptune Works of Messrs. Swan, Hunter & Wigham Richardson, Ltd. The steamer, which is built on the Isherwood system of longitudinal framing, is 365 ft. in length, and is intended to obtain the highest class in Lloyd's Registry. She will carry 6,000 tons of oil, distributed over 16 tanks arranged in pairs, and in each tank there is a very complete steam heating installation by means of which heavy oils may easily be dealt with. In every way she is an up-to-date and complete oil tanker. Her equipment will include an installation of wireless telegraphy. The propelling machinery, which is fitted aft, consists of a set of triple-expansion engines, supplied with steam by two boilers working under forced draught, both engines and boilers being constructed by Messrs. Swan, Hunter & Wigham Richardson, Ltd., at their Neptune Works. The steamer is being built to the order of the Mexican Petroleum Company, Ltd.

Wagama.—On March 11th, Sir Raylton Dixon & Co., Limited, launched from their Cleveland Dockyard, Middlesbrough, a fine steel screw steamer which they are building to the order of Mr. Ragnvald Blakstad, on behalf of the Aktieselskabet "Asker," Christiania. The vessel is of the builders' latest improved patent Cantilever construction, with top-side water ballast tanks, and is being constructed to receive Lloyd's 100 A1 classification, single deck type, with poop, bridge and forecastle. Her principal dimensions are 393 ft. by 52 ft. 6 in. by 30 ft. moulded, and she will have a deadweight carrying capacity of about 8,000 tons on a light draft of water. She will have five large hatchways, four holds absolutely free from all obstructions such as beams, pillars or web frames and perfectly self-trimming owing to the sloping sides of the top-side tanks at each side of the ship, and of the total amount of about 2,800 tons of water ballast which the vessel can carry, more than half this quantity will be contained in the top-side tanks. The steamer will have two masts, two derrick posts, and ten derricks, hand and steam steering gear, electric light, and the equipment will consist of ten steam winches, steam windlass, etc., and all the latest and most modern appliances for the rapid handling of cargo. Triple expansion engines having cylinders 25½ in., 42 in. and 70 in. by 48 in. stroke, supplied with steam by three large single-ended boilers, working at 180lbs. pressure, will be fitted by Messrs. Richardson, Westgarth & Co., Ltd., Middlesbrough. The hull and machinery are being constructed under the supervision of Captain Harbo Jensen, the owner's superintendent, and Messrs. C. A. Bushell, Nicol & Co., of Newcastle-on-Tyne.

Scott & Shackleton.—On March 11th, there were launched from the yard of Messrs. Cochrane & Sons, Ltd., shipbuilders, Selby, two steel screw trawlers, the principal

dimensions being: 113 ft. 4 in. by 23 ft. by 12 ft. 9 in. moulded. The vessels have been built to the order of Messrs. Pickering & Haldane's Steam Trawling Co., Ltd., Hull, and will be replete with all the latest improvements for the fishing trade. They will be fitted with powerful triple expansion engines by Messrs. C. D. Holmes & Co., Limited, of Hull.

Harlow.—On March 12th, Messrs. Wm. Doxford and Sons, Ltd., launched from their yard at Pallion the large shelter deck steamer *Harlow,* built to the order of Messrs. J. & C. Harrison, Ltd., London. The dimensions of the vessel are: Length, 485 ft.; breadth, 58 ft.; moulded depth, 31¼ ft.; deadweight capacity, 11,000 tons; 13 knots speed. The vessel is fitted with ten state rooms and a large smoke room. During construction the vessel has been under the superintendence of Mr. W. Crandell and Mr. J. White on behalf of the owners. The classification is with Lloyd's 100 A1. Engines and boilers are being supplied by Messrs. Doxford.

LAUNCHES—Scotch.

Carpati.—Recently, the new cargo steamer *Carpati* built to the order of Servicue Maritime Roman, was launched from the Greenock yard of the Grangemouth and Greenock Dockyard Company. The vessel has a carrying capacity of 7,150 tons, on 23 ft. draught. Her dimensions are: Length, 390 ft.; breadth, 53.3 ft.; depth, 28 ft. After the launch the vessel was towed to Glasgow, where her machinery will be supplied by Messrs. D. Rowan & Co.

Inniseane.—Messrs. P. MacGregor & Co., Kirkintilloch, have launched for the Motor Coasting Shipping Company, Glasgow, the motor coaster *Inniseane.* The vessel is similar in capacity to the four launched previously by the firm for the same company, having a gross tonnage of 95 tons and a deadweight of 150 tons. Her dimensions are: Length, 67 ft.; breadth, 18 ft. 3 in.; and depth 9 ft. 6 in. She is the first of the owners' fleet to be engined by Messrs. Goedkoep, of Amsterdam, with a Kromhout crude oil engine of 90 h.p. The firm have on the stocks other three vessels for the same company.

Elgin.—Messrs. A. & J. Inglis, Glasgow, launched recently the turbine steamer *Elgin,* the last of three sister ships which they have built for the South Indian Railway Company. These steamers have been designed to conduct a ferry service which the railway company is about to establish between Dhaneshkodi, in the island of Rameswaram, on the Indian side, and Talemanaar, in the island of Manaar, on the Ceylon side. They have a length over all of about 260 ft., a breadth of 38 ft., and a depth to the promenade deck of nearly 19 ft. Their gross tonnage will be rather less than 700. They have been built of steel throughout, and are classed at Lloyd's for special service. The propelling machinery, which is constructed by the builders of the ship, will consist of two sets of geared turbines of the latest Parsons type, one high pressure and one low pressure being coupled to each of the two shafts by means of machine-cut gears, each shaft driving one of the twin screws. The revolutions of the turbines will be about 3,500 per minute, while those of the propellers will be 500.

Jose de Larrinaga.—There has been launched at Port Glasgow the shelter-deck steamer *Jose de Larrinaga* which has been built for Messrs. Larrinaga & Co., Liverpool. The vessel, which has been constructed to the highest class at Lloyd's, is of the following dimensions: Length, 420 ft.; breadth, 54 ft.; depth moulded, 28 ft. 5 in.; and gross measurement, 5,000 tons.

Pegu.—There has been launched at Dumbarton the steamer *Pegu,* which has been built for the British and Burmese Steam Navigation Company (Messrs. P. Henderson & Co., Glasgow). The *Pegu* is 445 ft. in length, 55 ft. in breadth, and 31 ft. 4 in. in depth, and is similar generally to her predecessor, the *Chindwin.* The vessel, which has been built to the classification of the British Corporation Registry, will be supplied with triple-expansion engines.

Dewa.—On March 6th, at Scotstoun, there was launched the steamer *Dewa,* which has been built for Messrs. James Nourse, Ltd., of London, Liverpool, and Calcutta. The vessel, which is of about 3,000 tons gross, is specially designed for the carrying of natives between the East and West Indies. Machinery of the most modern type will be supplied.

Nagoya.—On March 8th, Messrs. Caird & Co., Greenock, launched the steamer *Nagoya* for the Peninsular and Oriental Steam Navigation Company. The principal dimensions are: Length, 450 ft.; breadth, 52 ft.; depth moulded, 33 ft. 6 in.; and gross measurement, about 7,000 tons. All the engine and boiler casings have been covered with Messrs. Matthew Keenan & Co.'s Patent Bulkhead Insulation, and their non-conducting composition has been applied to the boilers, pipes and flanges throughout the vessel.

Plethos.—On March 8th, a steam trawler, built to the order of the East Coast Steam Fishing Co., Aberdeen, was launched at that port. The vessel, which was named the *Plethos,* is 115 ft. in length, 22 ft. 6 in. in breadth, and 13 ft. in depth.

TRIAL TRIPS.

Harpathian On February 18th, the *Harpathian,* built by The Sunderland Shipbuilding Co., Ltd., to the order of Messrs. J. & C. Harrison, Ltd., London, was taken to sea on her official trial. The trial was in every way most satisfactory, everything worked extremely well; and notwithstanding the heavy sea and wind a mean speed of 12½ knots was easily obtained, at which Mr. Crandell, on behalf of the owners, expressed himself as being very highly pleased. The vessel proceeded direct to Barry Docks to load. For Launch, see February issue.

Reina Victoria Eugenia.—The *Reina Victoria Eugenia,* a Spanish mail and passenger steamer of the very highest class, has just completed her trial.

She has been built and engined at the Neptune Works of Messrs. Swan, Hunter & Wigham Richardson, Ltd., and is propelled by four screws, two of them being driven by twin screws, four crank triple expansion engines balanced on the well-known Yarrow Schlick & Tweedy system, and the two outer propellers are driven by low pressure Parsons' turbines.

Although the weather on the trial trips was not of the most satisfactory description, the highly satisfactory speed of over 18½ knots per hour was attained. The steamer will carry no less than 2,100 passengers, divided into 250 in the first-class, 100 second-class, 80 third-class, and a large number of emigrants, and the passenger accommodation has been decorated by the well-known firm of Waring & Gillow, Ltd., of London. Just before the vessel left the Tyne she was open for public inspection, and a large number of people availed themselves of the opportunity. For Launch, see November issue.

Eloby.—On February 22nd, the s.s. *Eloby* proceeded on her official trial trip. The vessel has been built by Messrs. Irvine's Shipbuilding & Dry Docks Co., Ltd., West Hartlepool, for Messrs. Elder, Dempster & Co., of London and Liverpool, being intended for trading on the West African Coast. Owing to the foggy weather it was impossible to put the vessel on the Whitley Mile, but the engines were run to a high number of revolutions, and a good speed was obtained. The owners were represented on board by Mr. J. B. Wilkie, who expressed entire satisfaction. For Launch, see October issue.

Boeton.—On February 24th, the handsome steel screw steamer, *Boetan,* had her trial trip. She has been built by Messrs. Wm. Gray & Co., Ltd., for Messrs. The Netherland Steamship Co., of Amsterdam. The performance of ship and machinery was entirely satisfactory, an average speed of 13.5 knots being obtained. For Launch, see December issue.

Edith Callaghan.—On February 27th, Mr. Edward Hayes, of Watling Works, Stony Stratford, ran the trials of a new steel steam tug for Buenos Ayres, the *Edith Callaghan* with very satisfactory results. This steamer is 48 ft. long B.P., 11 ft. wide, 6 ft. 2 in. moulded depth, 4 ft. 3 in. draft, and is specially designed to pass under a bridge only 6 ft. from the water line; in fact, when the funnel is lowered, the stem post is the highest part of the structure. The steering gear is placed in a steel watertight cockpit just forward of the boiler bulkhead, and there are roomy cabins forward and aft for captain and crew. The machinery consists of a "Hayes" standard set of

compound surface condensing engines, having cylinders 8 in. and 16 in. by 10 in. stroke, and a large marine return tube boiler, built under Lloyd's Survey for 120lbs. per square inch pressure. An auxiliary bilge feed pump is also fitted, to supply water from fresh water tank, or boat side. On the measured mile an average speed of 11.68 miles was obtained, with only 240 revolutions per minute at the engines, which was well in excess of the required speed. In her steering trials she proved to be easily handled, and quick on the rudder. There were present at the trials: Mr. Sutherland and Mr. Newburn Hall, of Cardiff; Mr. D. A. Thomas, the well known coal owner, of Cardiff and London; Mr. H. Hudson, the purchasers' engineer; and Mr. Edward Hayes, M.Inst.C.E., the designer and builder. The purchasers of the vessel were so pleased with her that they have placed another order with Mr. Hayes for a vessel similar in every way.

Appam.—On February 27th, this fine large twin screw passenger and mail steamer, which has been built to the order of the British & African Steam Navigation Co., Ltd., Liverpool (Messrs. Elder, Dempster & Co., Ltd., managers), left Belfast for Liverpool, from which port she will shortly sail for the West Coast of Africa. The new vessel is 441 ft. long overall, and 57 ft. beam, with a gross tonnage of about 8,000. The vessel has been built under the survey of the Board of Trade for passenger certificate, and is generally similar to the s.s. *Abosso*, recently delivered to the African Steam Ship Co., of which Messrs. Elder, Dempster & Co., Ltd., are also managers. For Launch, see November, 1912, issue.

Edlington. On February 27th, the fine steel screw steamer *Edlington*, built by Sir Raylton Dixon & Co., Ltd., at their Cleveland Dockyard, Middlesbrough, to the order of Messrs. The Denaby & Cadeby Main Collieries, Ltd., of London, etc., proceeded to sea for her official trials. The trials passed off most successfully, and the vessel proceeded to Hull under the command of Captain J. M. Nicholson, where she will load for the River Plate. For Launch, see February issue.

Trevethoe. The new screw steamer *Trevethoe*, built at South Shields, to the order of Messrs. Edward Hain and Son, St. Ives, has been taken to sea for her official trial trip. The vessel will carry a deadweight of 7,850 tons on a light draught of water. She is of the improved single-deck type, to Lloyd's highest class, and under their special survey. The trial was in every way satisfactory. For Launch, see February issue.

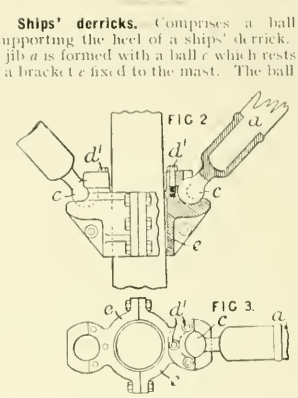
Nevasa.—The twin screw steamer *Nevasa*, built at Whitemch for the British India Steam Navigation Company, has run official trials on the Clyde. The lifeboats are capable of carrying many more than the total number of persons on board. On the trial a mean speed of nearly 16 knots was attained, the machinery working throughout in a thoroughly satisfactory manner. For Launch, see February issue.

The British Corporation.—The twenty-third annual meeting of the Corporation was held at Glasgow on February 26th, presided over by Mr. Robert Clark, chairman of the Corporation. The chairman in the course of his address remarked upon the prosperity of the past year, during which ship owners, as well as ship builders, had reaped a good harvest for their labours. It was a record year in the history of the Corporation and a larger amount of tonnage had been classified under their surveyors than any previous year. It was pointed out that the close association which had been formed with the Italian Registration Society had resulted advantageously for all concerned; while the formation of a committee in Liverpool had also been an important step accompanied by good auspices. The trials of the *Cairnross* were commented upon as showing a remarkable economy with the quick moving prime mover, reduced to give better propeller efficiency by means of helical reduction gear. Mr. Fred H. Stephen chairman of the Technical Committee, gave an interesting address, in the course of which he referred to the large number of plans and designs submitted for approval and deprecated further development of certain types. The association of the Corporation with new features introduced in the shipping world was referred to by the speaker. Tributes to the staff were paid by Mr. Stephen with special reference to Mr. Foster King and Mr. Benson Taylor.

Abridgments of New Patents.

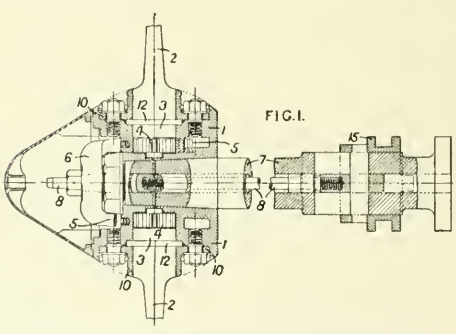
Compiled by Messrs. E. P. Alexander & Son, Chartered Patent Agents, 306, High Holborn, London, W.C.

24,991. Ships' derricks. Comprises a ball and-socket joint for supporting the heel of a ships' derrick. The lower end of the jib *a* is formed with a ball *c* which rests in a socket carried by a bracket *e* fixed to the mast. The ball *c* is secured



by a cap and bolt *d1*. The cap and socket are so cut away that the jib can move through 90 degrees in the vertical plane and 180 degrees in the horizontal plane. By providing two sockets as shown, loads can be dealt with all round the mast.

25,567. Screw and like propellers.—Blades of screw propellers are feathered by racks engaging teeth on the blade roots, the racks being carried by a common yoke on the central actuating-rod within the main propeller shaft. The blades 2 are rotatable on their axes in the boss 1 by racks 5



engaging toothed pinions 4 on the roots 3. The racks 5 are carried by a yoke 6 attached to a rod 8 which can be axially moved within the shaft 7 by the sleeve 15. The blades are held in the boss by angular flange rings 10 bolted to the boss and contacting with a collar 12 on the root of the blade.

26,136. Propelling ships.—In systems of ship-propulsion employing in combination turbines and internal-combustion engines with means for using them alternatively for high and low speeds respectively, the waste gases from the internal combustion engine are employed to produce steam which is directed into the turbine plant, where is enables a vacuum to be maintained by the ordinary air-pumps. Any excess steam may be used to drive the air-pumps or other auxiliaries and even to assist the turbine to propel the ship. The invention is specially applicable to the plant described in Specification 21,585/10.

BOARD OF TRADE EXAMINATIONS.

FEBRUARY 27th, 1913.—LONDON.—*1st Class:* A. Boyle, J. Daw, T. Hemingway. A. Henshaw, J. McKay. *2nd Class:* W. Brock, E. Harris, J. Richardson.

SUNDERLAND.—*1st Class:* J. Hartas, P. Wesley. *2nd Class:* G. Hazard.

NORTH SHIELDS.—*1st Class:* J. Clemitson, J. McMillan, J. Mordue. *2nd Class:* J. Allan, J. Anderson, W. Beaver, J. Dupear, F. Elgey, J. Lee, G. Mensforth, J. Stokell, W. Summerbell, H. Wright.

BRISTOL.—*1st Class:* C. Paradise. *2nd Class:* J. Douglas, R. Fitzgerald, B. Richards, P. Webb.

LIVERPOOL.—*1st Class:* J. Fonlkes, D. Horsburgh, G. Symons. *2nd Class:* J. Bodmer, R. McMillan, C. Morrison, J. Robinson, A. Smith.

GREENOCK.—*1st Class:* R. Patrick. *2nd Class:* A. Brewer, W. Campbell, A. Craig, J. Ferrie, J. Mackellar, C. Rankin.

ABERDEEN.—*1st Class:* S. Bates, P. Smith. *2nd Class:* J. Buyers, W. Davidson, J. Webster.

LONDONDERRY.—*1st Class:* J. Aiken, J. Robinson, J. Stewart. *2nd Class:* A. Cole, J. Webster.

HULL.—*1st Class:* G. Stewart. *2nd Class:* C. Gibron.

MARCH 6th, 1913.—LONDON.—*1st Class:* C. Holthouse, H. Lee. *2nd Class:* A. McGillivray.

NORTH SHIELDS.—*2nd Class:* J. McGinley, D. Younger.

GLASGOW.—*1st Class:* O. Bain Holtzman, W. Craig, J. Colville, J. Mackie. *2nd Class:* J. Brown, W. Fry, J. Gillespie, R. McCall, G. Stewart, J. Traill, G. Wylie.

CARDIFF.—*1st Class:* W. Dann, I. Davies, A. Evans. *2nd Class:* W. Jenkins, F. Lee.

LIVERPOOL.—*1st Class:* W. Hall, J. Jack, T. Jones, D. McGregor, A. Simmons. *2nd Class:* G. Charlesworth, F. Hendry, J. Hudson, E. Loseby, W. Mercer, H. Mugford, A. Wotherspoon.

LEITH.—*1st Class:* J. Bromley, D. Gemmell, J. Younger.

SOUTHAMPTON.—*1st Class:* W. Brownsea, G. Hardacre, A. Le Quesne. *2nd Class:* J. Hobbs, E. Morgan, R. Rennell, H. Wiseman.

MARCH 13th, 1913.—LONDON.—*1st Class:* W. Gower, W. Walker, F. Woollons. *2nd Class:* D. Cameron, H. Fidler, C. Starnes.

DUNDEE.—*2nd Class:* J. Landsman, E. Mudie, D. Spalding.

NORTH SHIELDS.—*1st Class:* J. Bird, O. Colbeck, F. Jeune. *2nd Class:* G. Blakey, H. French, G. Hair, W. Hall, R. Main, J. Marshall, W. Scott, E. Taylor.

LIVERPOOL.—*1st Class:* B. Harvey, J. Prichard, F. Sinclair. *2nd Class:* W. Jackson, E. Jones.

GREENOCK.—*1st Class:* A. Cairns, J. Clachrie, J. Goudie, J. McDonald, R. McFarlane, J. Murchie, J. Nicoll, E. Pybus. *2nd Class:* D. Baldie, J. Malcolm, J. Mallinson, D. Munn, R. Ross.

HULL.—*1st Class:* T. Richardson. *2nd Class:* J. Fowler, V. Pybus.

REVIEWS.

The Modern Warship. By Edward L. Attwood, M.Inst. N.A., Cambridge University Press. Price, 1/- and 2/6 nett.

This work is one of the Cambridge Manuals of Science and Literature and is a brief account of the modern warship written from the Naval Architect's point of view. In a small work of this character, less than 150 pages, space will not allow of reference being made to many points of interest in connection with warship design and construction, neither can any reference be made to contemporary warships of other countries. The reader of this work will be impressed with the fact that the naval architect, who is responsible for the completed ship, must obtain the co-operation of specialists in many departments. To illustrate this point the following may be indicated, the marine, electrical and hydraulic engineers, the artillerist, the metallurgist, the torpedo and compass specialists and the naval officers who have to navigate, work and fight the ship. The mental effort involved in the construction of a warship is always very large, but it is particularly so when such a ship costing over two millions sterling has to be built, launched, armoured, fitted out with machinery, armament, etc., and tested by speed, gun and torpedo trials in a period that does not exceed two years. It is to enable these points to be appreciated that the author has dealt with this subject in 12 chapters, which comprise, design, hull construction, armour, armament, equipment, stability and rolling, engines, boilers, etc., ventilating and pumping, watertight sub-division, steering and turning, power and speed, and lastly a chapter on the cost of warships.

The Manufacture of Iron and Steel. By H. R. Hearson, M.I.M.E. London and New York: E. & F.N. Spon, Ltd. Price, 4/6 nett.

This book is written with the object of giving a brief and simple outline of the principal operations in connection with the manufacture of iron and steel. It will be particularly useful and interesting to engineering students who have opportunities of seeing iron and steel manufactured, as it will enable them to easily understand the work that is going on. They can thus quickly acquire a practical knowledge of the various processes. The work opens with a chapter on the chemical elements in iron and steel, and the succeeding chapters deal with iron ores, the blast furnace, the manufacture of wrought iron and steel, the following steel processes, *viz.*, Siemens-Martin, basic open hearth, the acid bessemer and the basic bessemer processes. The last four chapters deal with the treatment of steel ingots, the effects of adding other metals to steel, the mechanical testing of steel, and lastly, the heat treatment of steel. The work which consists of rather more than 100 pages, contains some instructive illustrations and the general treatment of the subject is concise and not too technical for the average student.

The New Steam Tables. By C. A. M. Smith, M.Sc., and A. G. Warren, B.Sc. London: Constable & Co., Ltd. Price, 4/- nett.

This work comprises a set of tables, together with an explanation of how the values have been calculated. It is based upon the researches of Professor H. L. Callendar, and contains an interesting introduction by Sir J. Alfred Ewing, K.C.B., F.R.S., who expresses the view that the work will do something towards making engineers better acquainted with the important service which Professor Callendar has rendered them in supplying materials for a new determination of the properties of steam, and towards facilitating the use of correct values in steam calculations. It is thought that this work will be a valuable aid to those engaged in research relating to steam problems.

Steam Turbines, their theory and construction. By A. Wilda. Translated from German by Chas. Sadler. London: Scott, Greenwood & Son. 1912. Price, 3/6.

This is another of those handy little volumes published at the present time in which much information is compressed in a small compass. We have first the properties of steam with due relation to the system of employing it presented to us. Turbines have to do with the velocity of the acting medium as well as the pressure, and the rules governing the matter are sufficiently complex as seen here, and require some considerable technical knowledge to properly comprehend. In the second chapter on the flow of steam through the vanes of the turbine we have the leading principles clearly pourtrayed for the best known types on both the impulse and reaction systems, and it is possible for any well-read person to form a clear conception of the subject from what is found here, steam consumption and efficiency being the leading features closely reasoned out. In the third chapter we have the actual details and mostly the parts in section. There are the machines themselves and the nozzles and guides, bearings, stuffing boxes and governors, while in the fourth chapter the general arrangements are described with figures given so that it is possible to compare one type with another in a great measure. In the fifth chapter the author treats of condensers and the utilisation of exhaust steam, and, as it is with turbines, well known to be an important feature owing to the fact that expansion is carried much farther than with reciprocating engines, some attention has to be paid to the vacuum. In the practical application of the turbine the author notes their bearing on dynamo construction and also their use for marine propulsion. In the latter case he does not hold there is any real economy over reciprocating engines. He shows the methods of application for merchant ships of a

Parsons machine and how the reversing is affected. Perhaps the chapter on the condenser is a little smaller than we should have expected to find it, but generally these pages are of a high order. We have not enumerated the different makes of machines found, but we should say none of any importance are missed, and it would hardly be possible to find a better description of the present position of the subject both from a theoretical and practical standpoint than these pages indicate. The drawings are clear, and as regards the parts we should say often original, whereas the larger ones are sectioned and full, so that it is possible to have a complete idea of the matter right through. An index finishes what is no doubt a useful contribution to our technical literature.

The Marine Engineers' Drawing Book. By W. C. McGibbon. Glasgow: Jas. Munro & Co. 5/- nett.

The percentage of marine engineers who have had an opportunity of gaining experience in the drawing office, is a small one and yet it is a very valuable asset to have included in the engine room complement a good draughtsman, who can make a sketch and transfer it to a scale drawing with dimensions marked. We have found the value of such a one when details required for an incoming steamer have been advised and, along with the requisitions, a scale drawing or neat dimensioned sketch has been forwarded. There is an art in placing all the dimensions on a sketch, and it is an aggravating experience to receive an artless sample with all sizes marked save the one essential to link up the detail with the adjoining part. The book before us is the seventh (enlarged) edition. It is clear and concise in pointing out the requirements in the construction of a sketch and a drawing, emphasizing the essential points to be observed in order to lay down on paper what has to be reproduced in a finished article. The first point is to have a clear conception of the detail to be sketched, the second is to have an understanding of what the sketch is for, *i.e.*, to make beyond doubt a representation of the detail, so that it may be constructed from the sketch, and the third is to realize that the omission of one dimension may be the means of failing to convey to the constructor the vital part of the sketch. There are a large number of drawings shown in the book, with sizes marked, and in each case a statement is given as set forth in the Board of Trade examination papers and instructions as to the drawing and the dimensions with the rules for working these out in accordance with practice and Board of Trade regulations. The book is expressly intended for the service of marine engineers about to go up for examination to obtain their certificates, and to such it is of great value, but it is also useful to others who desire to improve and qualify themselves for future service. There are hints for the guidance of beginners, tables and notes giving proportions of the leading parts of an engine, rules for shafting, boilers, etc., but these only occupy a few pages in the prefatory portion of the book, the main feature of which is to give drawings of the principal details of a marine engine.

Year Book of the Scientific and Learned Societies of Great Britain and Ireland. Price 7/6. London: Messrs. Charles Griffin & Co., Ltd.

The twenty-ninth annual issue of this publication has made its appearance, recording the work done by the various scientific and learned societies during the session 1911-1912. The information contained in its pages is compiled from official sources and is thus reliable and accurate. The book gives a brief *resume* of the subjects which have been dealt with by the societies during the past twelve months, and, in addition, gives the conditions of membership, names of officials, dates of meetings, publications, etc. It will thus be seen that it is a most useful publication, and to the scientific worker who desires to trace what has been done in any subject, it must prove of great service. The societies are arranged in fifteen sections, this classification adding to the usefulness of the work. Thus, if we take the section "Naval and Military Science," we find all the societies dealing with this particular branch of science grouped under this section and with all particulars conveniently set out. The publishers are to be congratulated in producing a book of very considerable use.

Directory of Shipowners, Shipbuilders and Marine Engineers, 1913. London: The Directory Publishing Co., Ltd. By subscription, 5/-; after publication, 10/-.

This useful directory is in its eleventh year of publication, and the edition for 1913 has been thoroughly revised and brought up-to date, the number of pages being 845, an increase over last year's edition of 30 pages. The information in this work, which is very conveniently arranged, is of a most useful kind, and the value of the book grows year by year as a work of reference. The main part of the publication is taken up by two sections, the first of which is the section termed "Shipowners," under which the various shipowning firms are set out in alphabetical order with information concerning officials, loading berths, agents, fleets and their services. "Shipbuilders, Marine Engineers and Dry Dock Owners" is the next section, which, in addition to information relating to officials and offices, states the maximum annual output, either of ships or engines, and in the case of dock owners, the dimensions of the docks. There is a personal and boat index and other useful indices, while the officials of the Admiralty and the classification societies are also given. Every care is taken to provide for the accuracy of the contents of the book as far as lies in the power of the publishers. The volume is essential to all those in any way connected with the marine world.

Macdonald's English Directory and Gazetteer, 1913. In two volumes. 27th year. Edinburgh: Messrs. William Macdonald & Co., Ltd. Subscription price, 30/-; after publication, 50/-.

The 1913 edition of this directory has been issued, with map and fourteen town plans. Several important sections have been added, including lists of H.M. Ministers, Members of Parliament, Colonial Government representatives in London, British Consuls, etc., etc. This publication shares with the London Post Office Directory the distinction of being one of the biggest books published. It is a most comprehensive directory and includes lengthy lists of professions, trades and businesses of all the cities, towns and counties of England, Wales, Isle of Man and Channel Islands. Vol. 1 consists of a trades directory of London and suburban districts, followed by the principal provincial cities and towns in alphabetical order. This volume also contains the gazetteer, which is a voluminous one. Vol. 2 deals with the English counties, taking in those towns not included in Vol. 1, and also all villages of importance in England and Wales. One of the advantages of this Directory is that it contains information, in order to get which elsewhere one would have to expend a considerable sum of money and time on a number of local and county directories. The publishers are to be congratulated on the comprehensive character of the directory and its accuracy of detail.

Sell's Telegraphic Addresses, 1913. London: Henry Sell. Price, 25/-.

This publication is now in its twenty-eighth year, and its history has been one of continual growth. First appearing as a small book of a few hundred pages, it has now grown to be a volume of over 2,500 pages. The book is the only list published of registered telegraphic addresses, compiled from official lists supplied by the authority of the Post-Master General. The main part of the publication is taken up by the list of firms having telegraphic addresses, arranged alphabetically in two sections—London and the Provinces. This list contains the name of firm, place of business or other address, telephone number and the telegraphic address. The next section gives the telegraphic addresses arranged alphabetically of London and the provinces, this list being followed by a very voluminous classified trades section. The work closes with a long list of Colonial and foreign cable addresses which must prove of great service to a business house. The directory will be found to be an extremely useful one, and is arranged in a most convenient manner for reference.

TRIAL TRIPS—continued.

Infanta Isabel De Borbon.—The new passenger steamer *Infanta Isabel de Borbon*, built at Dumbarton, to the order of the Compania Transatlantica, Barcelona, for the passenger trade between the South of Europe and South America, has run successful trials on the Clyde. A mean speed of 18.64 knots was obtained on the measured mile. The vessel is of the first-class passenger type, and a feature of the design is the special strengthening of the hull so as to enable guns to be mounted, should the vessel be required for service as an armed cruiser in time of war. For Launch, see November issue.

The Marine Engineer

And Naval Architect.

LONDON, MAY, 1913.

OIL FUEL IN THE NAVY.

WE are sure that many people who have followed the fuel problem as closely as we have ourselves must have been surprised at some of the observations recently made as to the probable purport of the report of the Royal Commission on the question of fuel for naval vessels in the future, and the statement of the First Lord of the Admiralty in Parliament as to oil fuel and oil engines clearly indicates that such surprise was justified. If we understand Mr. Churchill aright his view is that, while development towards some satisfactory form of internal combustion engine suitable for all kinds of warships is being steadily made, we have not yet arrived at such a satisfactory stage that oil fuel can be employed exclusively, and that coal must continue to be the fuel of the first-class battleship. We have previously indicated the direction of the experimental work already being carried out, and everyone interested will watch for the results of these efforts to define the limitations of oil fuel and oil engines. At the moment the view of the Admiralty appears to be that not only is there no internal combustion engine proved to be satisfactory for war vessels, but further the question of oil fuel itself is one which is worthy of the deepest consideration from the technical aspect as well as from the strategic aspect of the question. In this fuel question, factors outside the scope of naval requirements have clearly indicated in the recent past that the supply of oil fuel in this country is totally insufficient to run a navy of oil-engined vessels, and in fact the oil fuel supply of the world is very nearly a practical monopoly. One could not, under these circumstances, conceive any responsible body of business men allowing the efficiency of the navy, on which the integrity of the Empire depends, to be controlled by the private monopolists as to supply of fuel available. It is clear that under the circumstances set out so clearly by the First Lord of the Admiralty we must still be in the position of using coal as the main fuel, although a considerable amount of oil is still used in the boilers, either alone or in conjunction with coal, and this view is held in spite of the opinion, fully proved, that oil fuel will give a higher duty in an internal combustion engine than under a steam boiler. Conditions in the directions indicated will have to alter considerably before we arrive at the day when it will be safe to rely on a navy wholly equipped with oil engines or even with internal combustion engines driven by producer gas obtained from coal.

ARMING THE MERCANTILE MARINE.

THE conditions governing the arming of the mercantile marine have considerably altered during the last few years, and it is evident from statements made at the House of Commons that efforts are to be made in order to produce closer co-operation between the Admiralty and bodies controlling the merchant service.

It was pointed out by Mr. Churchill that at the Second Hague Conference and at the London Conference, certain of the Great Powers reserved for themselves the right of converting merchant steamers into cruisers and to carry out such work, not only in national harbours, but also when necessary upon the high seas. Under these conditions it is possible that a considerable number of foreign merchant steamers may be rapidly converted into armed ships by the mounting of guns thereon; the trade of the world carried on across the seas, follows well-defined routes on which it may be stated that the tonnage of British-owned ships largely predominates, so that our food-carrying vessels, as well as those carrying raw material would, under certain contingencies be liable to meet foreign vessels armed and equipped in the manner referred to. It follows, under these conditions, that any British ship with no armament would be at the mercy of any foreign liner carrying one effective gun and a few rounds of ammunition. The expenditure of money for the building of an effective number of cruisers to deal with the large number of foreign armed merchant cruisers would be so large as to be absurd, and would be altogether disproportionate to the expense involved by any foreign power in creating the danger referred to.

The First Lord points out that hostile cruisers, wherever they are found, will be covered and met by British warships, and the proper reply to an armed foreign merchantman is a British merchantman armed in her own defence. The Admiralty have thought it desirable to point out the danger to life and property which would be incurred if British vessels were totally incapable of offering any effective defence to an attack, and for this reason it is necessary to draw the attention of large shipowners to the matter in order to invite their co-operation. It is satisfactory to note that the shipowners have responded to this invitation with great cordiality, and Mr. Churchill stated that substantial progress has been made in the direction of carrying out to a defensive measure by the preparation that has been made to equip a number of first-class British liners to repel the attack of armed foreign merchant cruisers. The first vessel so equipped is the Royal Mail Steam Packet Company's ss. *Aragon*, which carries two mounted guns, and sailed for South America on April 25th from Southampton. It was pointed out that vessels so equipped have, of course, a totally different status from that of the regularly commissioned merchant cruisers, such as those provided under the Cunard agreement. The Admiralty consider the greater part of the cost of the necessary equipment should not fall upon the owners, and they decided, therefore, to lend the necessary guns, to supply ammunition and to provide for the training of members of the ship's company to form the guns' crews. The cost of the necessary structural conversion, which, however, is not great, is being defrayed by the owners of the ships. While the British mercantile marine will, as a matter of course, have the protection of the Royal Navy under all possible circumstances, it is obviously impossible to guarantee individual vessels from attack when they are scattered on their voyages all over the world. The First Lord concluded by stating that no one could pretend to view these measures without regret or without hoping that the period of retrogression all over the world, which has rendered them necessary, may be succeeded by days of broader international confidence and agreement than those

through which we are now passing. These sentiments will, we are sure, be shared by all people who view with the proper sense of proportion the difficulties with reference to international complications.

COMMUNITY OF INTERESTS

IT may not be considered unjust by a politician even by one whose profession of a good ethical standard would lead one to expect better things to arouse strife between different sections of the community, but to the onlooker, to whose sense of fairness such tactics are abhorrent, it appears both unlawful and inexpedient, especially as the force of example tells in many directions to the detriment of the national well-being. For instance it is much to be deplored that the spirit of animosity is fostered, by an idle-minded few among those whose community of interests ought to be as a homogeneous whole. A considerable improvement has arisen during the last 25 to 30 years in the relationship between the Deck and the Engineer officers, and the more friendly terms generally established have been an advantage of a pleasurable character to all concerned. The essentials of a well-conducted and commercially successful vessel are, firm discipline, a high sense of duty and a considerate regard for all hands. The last essential is unhappily sometimes lacking—due to want of cultivation, and it may be that the other essentials are somewhat distorted by reason of individual idiosyncrasies, which make for strife. It is true that men are differently constituted, but all have an opportunity of working for good and making for peace, keeping in view the *summum bonum*. Why the spirit of diabolus should be allowed to interpose between the departmental officers of a vessel to engender venom is a question to be pondered over and answered by those who have experienced such, then by tracing the effect to the cause, endeavour to remedy the conditions. As one individual in a ship's company may cause much trouble by venom, so also one man may do much to assist in counteracting evil influence and maintaining good relationship all round—commanding respect for the duties attaching to his own office as well as for the duties of others. The weak-minded utterances which are calculated to engender animosity require to be strongly protested against, and a feeling of mutual respect between the departmental officers inculcated and encouraged. It is unfortunate that the first personal pronoun looms so large in the estimation of some whose minds have not been allowed to expand sufficiently to recognise the superlative importance of the second and third person; the loss is certainly with the egoist and it is well that he should know it for his own sake and that of his cloth.

HAWKE-OLYMPIC APPEAL.

The judgment of the Court of Appeal in the *Hawke-Olympic* case has now been given. The Court took notice of the further evidence put forward by the owners of the *Olympic* as to the true place of collision as afforded by the results of the expensive dredging which they had undertaken in the Solent. It will be remembered that after the hearing of the case by the President of the Admiralty Division, part of the bows of the *Hawke* were found and raised from a position substantially to the north of the spot at which the Court had held that the collision took place. This would seem to be a strong point in favour of the case of the *Olympic*, since it tended to disprove the accuracy of the statement of those in charge of the *Hawke*, that that vessel had passed within twenty to thirty yards of the three buoys named in the case, and had never starboarded her helm. But though the Court felt convinced on the new evidence, that the officers of the *Hawke* must have been mistaken in thinking they had passed so close as this to the buoys, they held that there had been no starboarding. They also held that, on the speeds, the *Hawke* could not have been the overtaking ship, as she had not the speed to have got into the positions given in the times which the case allowed. The vessels not being an overtaking and an overtaken ship the crossing rules applied. The two ships were found to be on courses which converged at an angle of fifteen degrees. Of course, the *Olympic* was the vessel which had the other on her starboard hand. Thus, under the regulations for the prevention of collisions at sea, it was held that upon her lay the obligation to keep out of the other ship's way. Upon the *Hawke*, under that regulation, lay a duty to maintain her course and speed. Her speed the *Hawke* undoubtedly did maintain. The Court, finding that she did not starboard, it followed that she also maintained her course. Thus the Court of Appeal came to the conclusion that she was in no way in default for the collision, and that the onus must rest on the passenger steamer for not keeping out of the way, which they thought she could easily have done, as they found that she had plenty of room to the northward. Whether the case will go to the House of Lords or not does not as yet seem quite certain.

"TITANIC" ENGINEERS' MEMORIAL.

THE following figures have been communicated to us by the hon. secretaries of the committees.

Institute of Marine Engineers London, up to April 24th	£2737	16	0
We are informed that contributions have been received by The Institute of Marine Engineers from over 406 vessels.			
Southampton Committee (this fund is now closed). Amount collected	£1682	0	0
Liverpool Committee (for the erection of a monument in Liverpool), up to 24 April	£5257	0	0
Total	£9676	16	0

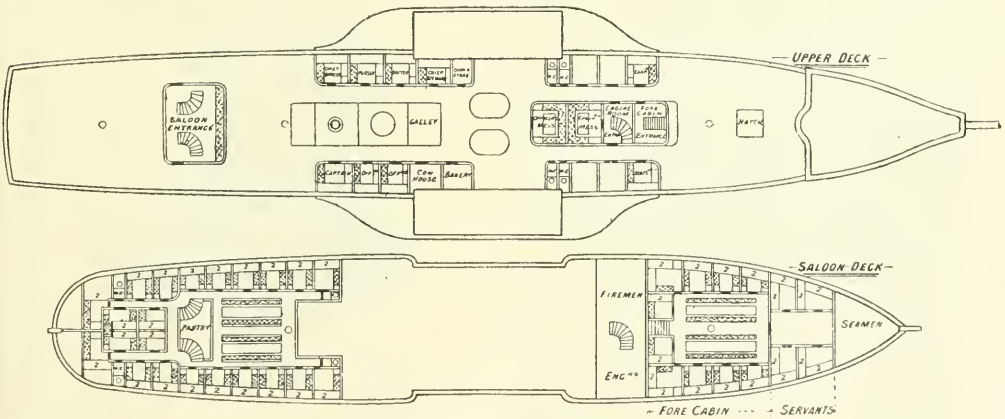
With regard to the Liverpool Fund, it may be remembered that in August last upon application to the City Council for a site for this memorial in the neighbourhood of the Pierhead, a sympathetic reply was received granting the request, but stating that as important improvements in this vicinity were then contemplated by the Corporation, the exact position could not be definitely fixed. Lately another request has been made for a definite site which will, it is thought, not interfere with these improvements, and to this a reply has just been received from the Town Clerk stating that the matter has been referred to a sub-committee for an early reply. The handsome sum of over £5,000 has now been subscribed, so that when the site has been definitely fixed by the Corporation, the committee will at once proceed to obtain designs and have the memorial completed without further delay. It will be readily understood that until the Corporation communicate their decision the committee of the memorial are not in a position to publish the form which it will take or the definite site which it will occupy.

A special appeal was issued some little while back by the Liverpool Committee to raise the fund to £6,000, which sum is considered necessary to erect a suitable memorial.

The Story of the Cunard Line.

THE organization which boasts the proud distinction of being the premier Atlantic Company—without any qualification as to station, route or nationality—was not actually the earliest Company to be got together for the purposes of steam navigation on the Atlantic. There were the British and American Company, which despatched a steamer from the Thames in 1838, and the Great Western Company, of Bristol, as well as the Sir John Tobin adventure, which made its sailings from the very port of Liverpool with which the Cunard Line has for seventy-three years been so closely identified. But two of the three rivals named were short lived indeed, whilst a few years saw the transfer of the famous *Great Western* to the Royal Mail Steam Packet Company. Cunard's were the first Atlantic Company to work the business of running steamships with advantage to themselves, the mails and the travelling public. The inception of the Line was due to the initiative of old Samuel Cunard, a native of Nova Scotia, who, becoming impressed in the later thirties with the possibilities of steam navigation, came over to England to press his ideas. His projects met with acceptance on the Clyde from the Messrs. Burns, who already had found the use of steam for driving vessels in local trade, and in Liverpool the now well-known family of MacIver entered heartily into the project. Above all, he succeeded in getting the approval of the Admiralty, who, in those days were charged with the duty of arranging oversea postal contracts. The originators of the new line realized that if they were to give a regular service they must have an ample fleet and have plenty of reserve power. To-day it is hardly possible to realize the difficulties of control over an ocean service If all went well, as the Cunarder passed the Rock at the entrance to the Mersey, she disappeared entirely from the reach, as well as from the ken, of the owners. She might possibly be reported as having been passed at sea by an east-bound vessel, but as likely as not she brought on her westward voyage the report of her own arrival outwards. Thus, it was necessary to have always at least one vessel ready to take up a sailing in case the appointed ship did not turn up to time. The original contract provided for a monthly sailing from Liverpool to Halifax and Boston. Two steamers could apparently have worked the schedule, but a set of four sisters was provided. Thus, complete fulfilment of the obligations assumed was achieved. Early in the year 1840, when the contract was taken up, a small steamer was sent out by the Company to serve as a feeder to the ocean steamships, and on the 4th July, 1840—the principal anniversary kept by American citizens—the pioneer steamship *Britannia* was despatched for Halifax and Boston. The three other vessels built to aid her in the work were the *Acadia*, *Caledonia* and *Columbia*. Their gross tonnage was but 1,154 tons each; their length was 207 ft.; their beam 34 ft. 4 ins., and their draught 16 ft. 10 ins. Each had accommodation for 115 passengers. There was bunker capacity for 640 tons of coal—which would keep the *Mauretania* going for about half a day—whilst their holds had space for 225 tons of cargo. Their speed was between eight and nine knots. All four vessels were built on the Clyde. Three years later the *Hibernia*, of 12 ft. greater length and of 530 tons greater displacement, was added to the fleet. Her coming was opportune, as the same year saw the casting away on the American coast of one of the four pioneers, but there was no loss of life.

The fleet was brought up to five again by the addition in 1845 of the *Cambria*, sister to the *Hibernia*. A regular fortnightly sailing had been instituted in the spring of 1841, and it was not till 1848 that any real change occurred. In that year the competition, actual and promised, of American rivals had made it desirable to strengthen the fleet, and four new and improved



CUNARD R.M.S.S. BRITANNIA, 1840.

The Cunard Pioneer Steamship *Britannia*, 1840.

Built of wood
Paddle wheel

Length, 207 ft
Beam, 34 ft. 4 ins
Tonnage, 1154
H.P., 740.
Speed, 8½ knots

vessels were added. These were the *Niagara*, *Canada*, *America* and *Europa*. Their length was 251 feet and their gross tonnage over 1800 tons. They were of over ten knots sea speed. Towards the close of 1847 the Cunard Company arranged a new contract whereby New York was to be made the United States port of destination alternately with Boston. Fortnightly sailings were still to be the rule during the winter months, and so remained for three or four years. But during the summer a despatch was to be made from Liverpool every Saturday. Even at this time, and with the additional facilites that were available, one notices that freights remained high—£4 a ton was quoted in 1848 for a vessel which did not carry the mails. In 1850 the Company put two 2,000-ton vessels, the *Asia* and *Africa*, on to the route, to be followed a little later by the *Arabia*. The first ship of this name was sold to replace a loss in another fleet, but a second and identical vessel followed. She is remarkable for the fact that she was the last and greatest of the Company's wooden vessels, being of 285 feet in length and of 2,400 tons gross register. Her speed was over twelve knots, which in 1852 was a remarkable speed indeed. The year 1853 saw further developments, the line to Havre from Liverpool being instituted to feed the mail line and compete with those American liners which went to the French port, and also the line to the Mediterranean, which also had for one of its objects to carry cargo for the mail steamships. Iron as a material and the screw as a means of propulsion, had by this time asserted their superiority over wood and the paddle wheel, and so the new branch steamships were iron screws, but the Admiralty did not as yet care to risk Her Majesty's mail's in such new-fangled craft, and it was not until 1855 that the *Persia*, an iron vessel, but still of the paddle-wheel type, was allowed on the mail line. This vessel, constructed and engined by David Napier, was one of the most graceful vessels ever launched. She was of 3,300 tons gross register. Soon after she came out the opposition of the United States line, once so keen and dangerous, ceased, and, save for the competition of British lines, the Cunard Company had the field to itself. One result of the rivalry had been that the call at Halifax for the New York steamships first, and afterwards for the Boston liners was discontinued. The *Persia* was not the last paddler of the fleet, a still larger vessel of the type registering some 600 tons more than she, coming out in 1862. The *Scotia*, as she was called, was of over 4,500 i.h.p., and burnt upwards of 160 tons of coal per diem. She eventually, after a brief though notable career of ten to a dozen years, was sold out of the service, and for many years

David Mac Iver

(Associated with Samuel Cunard in founding the Cunard Line.)

The *Persia*.
1855. Paddle wheel.

Length, 376 ft.
Beam, 45 ft. 3 in.
Depth, 31 ft. 6 in.
Gross Tonnage, 3,300
I.H.P., 4000.
Speed, 13·8 knots

The first iron ship of the Company.

afterwards did excellent work as a twin-screw cable-laying ship. The *China*, which came out in the same year as the *Scotia*, was the first screw mail steamer built for the line. She was of only 2,500 tons and 2,200 i.h.p.—a much less expensive ship to run. But she had only a small fraction less speed than the bigger ship, so there was no possible reversion to the older type. Other vessels were quickly added, the famous *Russia*, of just under 3,000 tons, coming out from the Clydebank yard in 1867. Her sea speed was thirteen knots. She carried 235 passengers, all in the saloon, and was for long the favourite ship on the Atlantic.

The Cunard Line has always made safety its first consideration, and, in view of certain discussions which have taken place of late, it is interesting to note that nearly sixty years ago their United States mail steamships adopted a route which should, as far as possible, avoid ice during the season when it is to be expected on the Atlantic. A few years later the call at Queenstown was instituted, and this stimulated the emigrant traffic. But it was in the later sixties, after the Civil War was ended, that there was so great a rush to the States that the number of weekly sailings attained its maximum. There was every week a despatch to Boston and often three to New York, an extra sailing being made in the middle of the week and a second vessel being sent off with the mail steamer on Saturday. Yet the totals that could be carried in all these bottoms together would fall far short of the numbers that can be accommodated in one of the vessels of the present fleet. At the beginning of the seventies other Liverpool lines began to put on large, fast and luxurious vessels, and Cunard's responded with such steamships as the *Bothnia* and the *Scythia*, of 4,500 tons in 1874-5, and the *Gallia*, somewhat larger, in 1878. But it was not till about 1880, a couple of years after the line had become a joint stock company, that a vessel which should again be in the forefront as regards size and speed was determined upon. The Clydebank yard then received an order for the *Servia*, the first vessel

S. Cunard

Yours Sincerely
George Burns

(Associated with Samuel Cunard in founding the Cunard Line.)

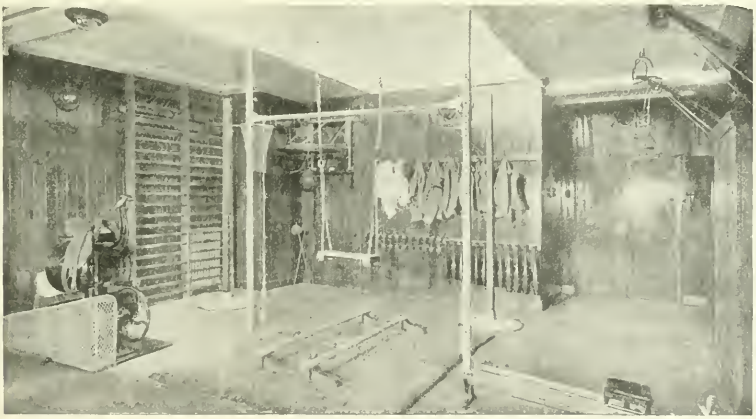
The *Scotia* 1862, length 379 feet. Beam 47 ft. 8 ins. Depth 32 feet. Gross tonnage, 3871. I.H.P. 4900. Speed 14·4 knots, built of wood. The last paddler of the fleet. She started on her first voyage from Liverpool on May 10th, 1862.

in the New York trade to be built of steel. She was of the unprecedented length of 515 feet and was of about 17 knots speed. A vessel of greater tonnage and more beam, but of less length, followed in the *Aurania*, and then came the determination to take and hold the record for speed. The Fairfield Shipbuilding Company produced in 1884 the *Umbria* and *Etruria*, of 8000 tons and 20 knots. They had single screws, driven by three-cylinder compound engines. At the same time the Company acquired the then holder of the record, the famous *Oregon*. Nine years later a more famous pair of sisters were turned out from the same Fairfield yard. These were the *Lucania* and the *Campania*, of upwards of 12,000 tons, fitted with twin screws driven by triple-expansion engines. Their speed was 22½ knots. The extra 2½ knots speed was attained by the provision of machinery which developed about 30,000 horse power as against 14,300 in the case of the *Umbria*, whilst the cost of the new ships was some £600,000 each, about double that of the previous vessels. When at the beginning of the present century the turbine engine was introduced, the

Drawing Room *Carenia—Caramania*. These vessels, built 1905, have each a length of 650 feet, and a tonnage of over 19,000. (The alcove, seen on the right of the illustration owes its origination to a suggestion by the Second Lord Inverclyde).

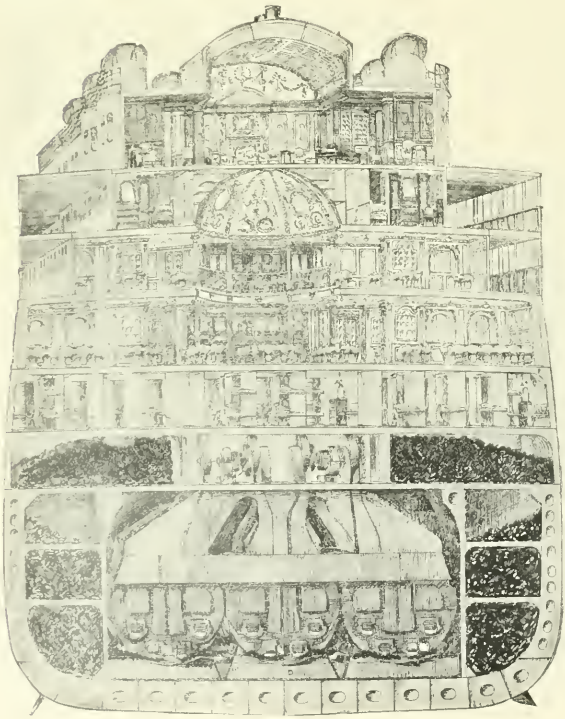
Verandah Café on the *Caronia* and *Carmania*.

Cunard Company was amongst the first to realise its immense possibilities. They experimented as to its merits on a large scale, ordering two vessels of about 20,000 tons each of the highest class. The passenger accommodation of these vessels was most luxurious. We illustrate a corner in the music room, showing the alcove—a charming feature due to a tasteful suggestion of the second Lord Inverclyde. They had one sister, the *Caronia*, constructed with the most economical type of reciprocating engine as yet produced, driving twin screws. The other sister was a triple-screw turbine. Encouraged by their experience with this vessel, the *Carmania*, they proceeded, under the advice of a committee of experts, of whom the chief were the late Sir William White and their own superintendent engineer, Mr. Bain, to have constructed, one on the Tyne and the other on the Clyde, the *Mauretania* and the *Lusitania*, vessels of then unexampled size (32,000 tons) and of speed still unexampled on the Atlantic. From the diagram showing the transverse section of these vessels it will be seen that they were fitted with side coal bunkers, as well



Gymnasium on *Franconia* and *Laconia*. These vessels, built in 1911, are 600 feet in length, and each have a tonnage of over 18,000.

The *Mauretania* at sea. This vessel, built in 1907, has a length of 762 ft. 2 ins. Beam 88 ft., depth 57 ft. 1 in. Tonnage 31,938



Transverse section of the *Mauretania* and *Lusitania*, showing double bottom and side coal bunkers extending to an unusual height up the vessel's sides.

A Marconi Room on a Cunard Liner.

as with double bottoms, extending to quite an unusual height up the vessel's side. These precautions made greatly for safety. The success of these vessels has been undoubted, and not only the Company, but the Government—who, recognising their possibilities as auxiliaries to the Navy in time of war, aided the Company to find the money for their construction—have abundantly justified their foresight. Since then other important ships have been added, notably the large Boston liners, *Franconia* and *Laconia*. The earlier of these two vessels was the first Atlantic liner to be fitted with a Frahm anti-rolling tank. These are now always introduced into modern Atlantic passenger vessels.

The most remarkable developments of the last dozen years have been the combinations which have taken place amongst shipping companies.

The formation of the International Combine, whereby an attempt was made by American capitalists to obtain control of the Atlantic passenger service, caused the Cunard Company to look in other directions for alliances, its directors determining that under no circumstances would they allow the Company to lose its British character. For some time they saw no opportunity of joining forces with any suitable companies. But within the last couple of years two important moves have been made. A substantial financial interest was taken in the Anchor Line of Glasgow—a Company which for nearly sixty years has maintained an Atlantic service, and which has also important connections with the Mediterranean and India—and steps were taken to secure the representation of each Company on the Board of the other. How far this inter-working may go, remains to be seen; but already there have on more than one occasion been Saturday mail steamer sailings from Liverpool taken by the fine steamships of the Anchor Line. Through the Anchor Line the Cunard Company has been brought into touch with another Company trading to India, the well-known line of Messrs. Thos. & Jno. Brocklebank, of Liverpool.

The purchase of the passenger side of the business of the Thomson Line was a move which showed a more prompt and decided effect upon the activities of the Cunard Company; for the vessels of that Company had established with twin-screw vessels up to 10,000 tons a regular service between London and Canadian ports, and had acquired a good passenger connection. The Cunard Company at once took measures to provide for it new ships, which should help to further develop the trade, and should enable it to make the despatches weekly in the near future. By this line they also arranged that opportunities should be given for passengers to use the port of Southampton, which had not previously known the Cunard House flag, on the westward and Plymouth on the eastward voyage.

Additions to the fleet are now made rapidly and continuously. Within the last few weeks the *Andania*,

Lusitania Grand Dining Saloon. The *Lusitania*, built 1907, has a length of 762 ft 2 ins. Beam 87 ft 8 ins Depth 56 ft. 6 in The gross Tonnage is 31,550

one of a pair of sisters for the Canadian service, has been launched by Messrs. Scott & Co., of Greenock, whilst an order for a third vessel to be called the *Transylvania* has been placed with the same firm. This vessel is primarily intended for the Mediterranean-Atlantic service, which maintains regular sailings between Austrian and Italian ports on this side and New York on the other. Westward these vessels take many emigrants, and in both directions they are largely used by tourists who find it convenient to go direct to the many popular resorts and historical spots which are to be found both on the European and African shores of the Central Sea. It was the *Carpathia*, a vessel engaged on this service, which came so opportunely to the rescue of the survivors of the ill-fated *Titanic* just a year ago.

But at the moment all attention is turned to the *Aquitania*, the largest vessel in the world, for she outstrips both the White Star Line *Olympic* and the Hamburg-American *Imperator* in tonnage. Like the *Mauretania* and the *Lusitania* she will be propelled by four screws actuated by turbine engines. But she will be more than half as big again as these vessels. All the devices for safety which experience suggested in their case will be embodied in her hull, and there will be others—including the provision of a watertight deck, as recommended by Lord Mersey in the *Titanic* enquiry. Though she is as nearly unsinkable as human foresight can make her, there will be boat accommodation for every soul she can carry, and amongst these lifeboats will be two fitted with motor engines, so that they will be able to tow the flotilla in case of need. The vast size of this vessel is indicated by one or two facts beyond the figures of her dimensions and tonnage. Much dredging was necessary in the Clyde to enable her to be launched, whilst adequate docking facilities will only be provided by the completion of the Gladstone Dock at Liverpool, which is to be opened by His Majesty the King in July, some little time before the *Aquitania* will need the accommodation. Again, the rudder weighs no less than 130 tons, and is so large that it contains a chamber to which access for those who have to shift the pin, is to be provided by a door. For the moment the *Aquitania* represents the last word in safety and luxury at sea, and yet we may be sure that when the Cunard Company sees the desirability of adding another vessel to its New York service, it will take the opportunity of embodying in her new and as yet unthought-of conveniences.

Of the public services performed by the vessels of the Cunard Company outside its carriage of the mails for now seventy-three years, there is no room here to speak in more than the most general terms. From 1854 to 1856 its service was much disorganised by the requirements of the Government in relation to the carriage of troops and stores to the Crimea, all the available Cunarders being handed over to the Admiralty. A few years later certain of its vessels took troops to Canada at a time when the international situation appeared threatening. Cunarders were employed in the Abyssinian campaign and in the various South African troubles, especially during the last Boer war, when even the *Umbria*, then one of the mail steamers, was pressed into the service. To-day, the two crack ships of the fleet, the *Lusitania* and *Mauretania*, are held at the Admiralty's disposal by a contract entered into when the vessels were first contemplated.

In conclusion, two points are noticeable in regard to this Company. First, the wonderful measure of safety with which its services have been conducted. For it still may be truly said that there has never been the loss of a Cunard mail steamer by which the life of a passenger has been sacrificed. The other point is its intense vitality. For to-day, as seventy years ago, it is still in the absolute forefront of the keenest competition of the shipping world, the mail service between Europe and New York.

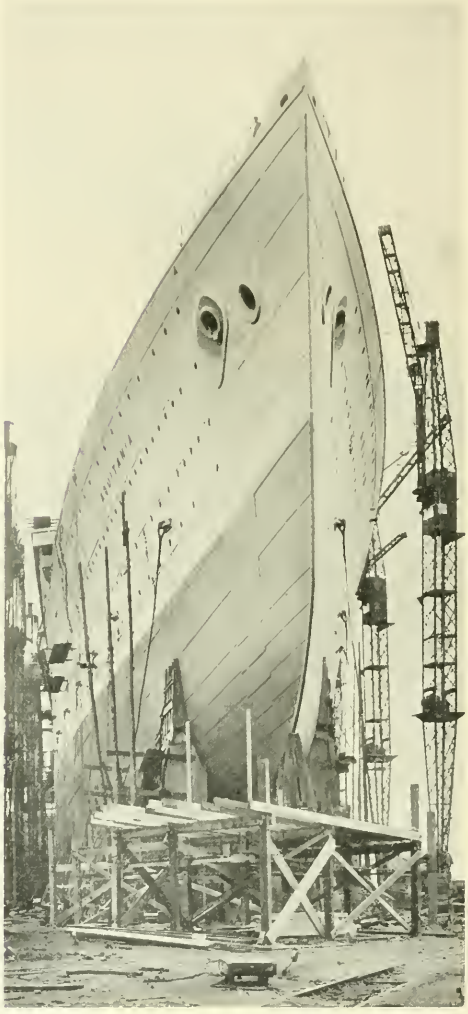
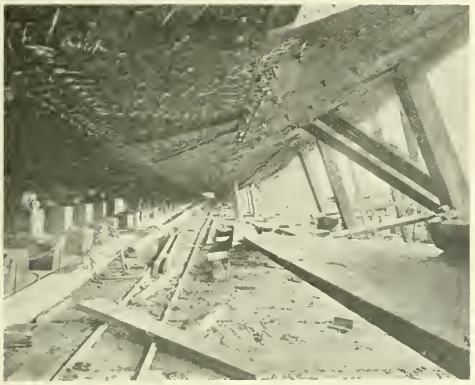


Illustration showing the bows of the *Aquitania*.



A view under the ship's bottom

The second-class public rooms include :—Drawing room, lounge, smoking room, dining saloon.

The public rooms and promenade decks (both open and covered) allotted to third-class will all be of the most generous dimensions.

There are altogether eight decks on which passengers are carried.

The division of the ship into watertight compartments is much more extensive than is required by any regulations, and exceptional conditions might therefore have been obtainable in connection with the lifeboats, but the Cunard Company, fifteen months ago, submitted their plans to the Board of Trade for an installation of lifeboats to accommodate every passenger on board. Two motor lifeboats will also be provided.

KELVIN MEMORIAL.

IT has been officially announced that the committee who have been working with a view to the placing of a stained glass window suitable and appropriate for the purpose, in Westminster Abbey, as a memorial of Lord Kelvin, have so far accomplished their object in that the necessary amount of money has been subscribed by the many friends and admirers of him who accomplished much in his day, for his own and succeeding generations. The various societies with which Lord Kelvin was associated, have taken part in the work of contributing through their members towards the fund now in the hands of the committee. A design for the window, prepared by Mr. J. R. Cowper, the artist selected by the Dean and Chapter of the Abbey, has been approved and the erection will be carried out under the direction of the authorities, and it is anticipated that the work will be completed about June or July. The window will be very elaborate and illustrative of historical events of an interesting character in connection with the Abbey, the inscription associating it with Lord Kelvin, being—"In memory of Baron Kelvin of Largs, Engineer, Natural Philosopher, B. 1824, D. 1907"; while beneath these lines will be the arms of Lord Kelvin and of Glasgow University. A melancholy interest is attached to the announcement regarding the accomplishment of the work of the committee inasmuch as the chairman of the Executive was Sir Wm. H. White, whose death occurred early in March and who was thus called away while looking forward to the placing of the Memorial in which he was so greatly interested.

COMPARATIVE TRIAL BETWEEN TRIPLE-EXPANSION ENGINES AND TURBINES.

THE members of the North-East Coast Institution of Engineers and Shipbuilders at Newcastle-on-Tyne, had an interesting paper read before them on the 28th March by Mr. C. Waldie Cairns, giving the results of a comparative trial recently carried out under his supervision, between a cargo steamer fitted with geared turbines and one fitted with triple-expansion engines. The steamers in question were the *Cairngowan*, with triple-expansion engines, and the *Cairnross*, with geared turbines. Both vessels are the property of the Cairn Line of Steamships, Ltd., of Newcastle.

Mr. Cairns said the *Cairngowan*, completed late in 1911, was looked on—by her owners at any rate—as a good example of the larger class of tramp steamer, with machinery and boilers of a good commercial standard for the attainment of a reliable 10 knots sea speed, with such economy of fuel as could be attained with relatively little complication of outfit. The *Cairnross* was the first ship of her type to be built to take geared turbines. The two ships were almost identical in essential characteristics as far as the trial was affected. Sacrifices were, however, made in the elimination of certain differences, and in some of these the turbine machinery undoubtedly lost some of its superiority. Among these sacrifices were :—

1. The boilers were identical in the two ships. In view of the quite sufficient boiler power in the *Cairngowan* the boiler power in the turbine ship was evidently at least 15 per cent. too great, entailing excessive radiation losses, as well as excessive weight of boilers and water.

2. The boiler pressures were kept alike—180 lbs. This was unnecessarily high for economy in turbines.

3. The propellers, tunnel shafting and thrust blocks were identical in the two ships. With turbine machinery, the shafting might have been reduced in diameter. Probably, too, the propeller diameter might have been reduced without loss of advantage in economy, with an increase of speed of revolutions of the propeller, and either a higher speed of revolution of the turbines or a lower ratio of reduction in the gearing.

The *Cairngowan* had already done about 14 months' ordinary work in River Plate, Black Sea and Eastern trades. Before proceeding on trial all main cylinders, pistons, and valves were examined by her own staff and representatives of her builders, and were found in good condition. Since last dry-docking (Rotterdam, Jan. 15, 1913) she had run from Rotterdam to London, lain in Thames four days, and run to Cardiff, where she lay fourteen days. The *Cairnross* since dry-docking had lain four days in South Dock, Sunderland, run in ballast from Sunderland to Cardiff, and lain twelve days in Cardiff. The condition of the skin of the ships might therefore be taken as identical. They were painted with similar paint.

Regarding the trials no "measured mile" results are available for either of the ships in question, neither of them having been on the measured mile off the Tyne. It will be understood that the object of the trials to be described is purely a comparison of the two ships under conditions as nearly identical as could be obtained. Therefore the two steamers, loaded, left Cardiff Docks on the morning tide of Thursday, Feb. 6, 1913. The Parsons Marine Steam Turbine Co., Ltd., Messrs. Wm. Doxford & Sons, Ltd., and Messrs. Cairns, Noble & Co., managers of the Cairn Line, each had three watches of observers on each steamer. The two ships were run by their usual staffs of engineers and firemen, the only additional assistance in stokehold being one man on each watch for the filling of coal skids.

On completion of compass adjusting, etc., the two vessels left Barry Roads about 4 p.m. on 6th Feb. As they proceeded down the Bristol Channel the weather freshened, and a strong head wind and sea were encountered by the time both ships were ready for coal measuring. The revolutions were therefore allowed to remain at from 60 to 62, the horse-power under these weather conditions, at 63 revolutions being heavy, and not representing anything like normal running conditions for either ship.

At 9 p.m. coal measuring commenced on each ship, both being then in the neighbourhood of Lundy Island. The vessels proceeded round Land's End, up the English Channel as far as St. Catherine's, where both vessels put about and back towards Brixham Coal measuring ceased at 9 a.m. Saturday Feb 8 thus allowing a continuous record for 36 hours, and Brixham was reached about noon.

Stormy weather was experienced throughout the trial. As the wind and sea were abeam only for a short time while rounding Land's End, being ahead or abaft the beam the remainder of the time no difficulty in keeping steam arose from rolling. In considering the results, it must be borne in mind that ordinary sea-going conditions of running were adhered to. Further, fires were burned down, cleaned, and made up just as in ordinary running on voyage. Again, in view of the careful and frequent determination of horse-power, any inflated figures were avoided, such as are sometimes put forward in steamship reports in which indicator cards, obtained when conditions are at their most favourable level on the day's work, are coupled with the coal consumption over the whole of a 12-hours' or 24-hours' trial.

The main result in which the owners of the two ships, and no doubt other shipowners, were interested was the ascertained coal per day of the two ships—32·7 tons for the triple-expansion set and 27·8 tons for the geared turbine set, a gain of 15 per cent. of the consumption of the triple set, or, stated in the other direction, the triple set demanded 17·6 per cent. more fuel than the turbine set.

As the *Cairnross* was at the same draught on the smooth water trial and on the 36-hours' trial a connection between the two trials may be established as follows :—It was found on 36-hours' trial that to maintain 138 lb. initial pressure (or, rather, steam flow resulting from same) a consumption of 27·8 tons of coal per day was required. Owing to weather conditions, the revolutions per minute on this trial were only about 61·8. 138 lb. initial pressure should give 64 revolutions per minute in smooth water. They might therefore safely deduce that for 64 revolutions per minute, in smooth water, with the ship in trial trim, the consumption of coal would be 27·8 tons per day. Of course, this 27·8 tons per day included coal for auxiliaries.

In attempting to extend the *Cairngowan's* 36-hours' trial result to smooth water conditions they were met with difficulties arising from change of feed per revolution and change of revolution between the trial figure 61·8 and the standard 64 revolutions, with their unknown effect on consumption. If they assumed, however, that the same effective horse-power was required in the two ships, at the 36-hours' trial condition and at 64 revolutions in smooth water—and this only involved the assumption of constant efficiency of the turbines from 61·7 revolutions per minute to 64 revolutions per minute—they might claim that in the case of the *Cairngowan* 32·7 tons per day should give 64 revolutions per minute in smooth water, any improvement in evaporate efficiency would improve both ships proportionately.

The following tabular matter is the summary of 36-hours' trial.

	Cairnross. Geared Turbine.	*Cairngowan.* Triple-Expansion.
Revolutions per min. (mean of 36-hour)	61·76	61·68
Coal per day	27·8 tons	32·7 tons
I.h.p.	—	1,790
S.h.p.	1,570	—
Ratio of s.h.p. *Cairnross* to i.h.p. of *Cairngowan*	87·7 p.c.	—
Lbs. of coal per i.h.p. hr. all purposes	1·35 lb.	1·704
Lbs. of coal per s.h.p. hr. all purposes	1·65 lb.	1·94 lb.
Estimate of water consumption per hour all purposes	22,000 lb.	27,200 lb.
Estimate of water consumption per i.h.p. hr.	12·3 lb.	15·18 lb.
Estimate of water consumption per s.h.p. hr.	14 lb.	17·3 lb.
Hot well temperature	79 deg. F.	104 deg. F.
Feed temperature	203 deg. F.	221 deg. F.
Estimate lb. of water per lb of coal (from feed temperature)	8·5 lb.	8·97 lb.
Percentage of ash	12·5 p.c.	9·36 p.c.
Pressure, steam pipe in engine room	158 lb.	175 lb.
Initial pressure, H.P. turbine	138 lb.	—
Vacuum	28·75 in.	26·8 in.
Circulating water inlet	50 deg. F.	50 deg. F.
,, ,, outlet	70 deg. F	95 deg. F.

WHITE STAR LINER "OLYMPIC."

Structural Alterations.

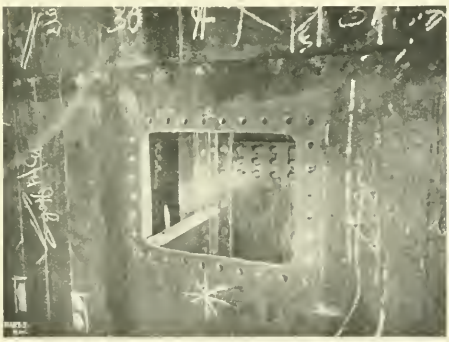
AS the greatest interest has been taken in the work that has been carried out in the White Star liner *Olympic* by her builders, Messrs. Harland and Wolff, Ltd., at Belfast during the winter, we propose to briefly review the alterations made to the vessel. The work consisted in the construction of an inner skin, port and starboard, from the tank top up to a point well above the water line, and the increase in the number and height of the water-tight bulkheads; and as the vessel was placed in the hands of the builders last October, and did not leave Belfast again until the 22nd March, it will be seen that five months have been taken in effecting the improvements. Bearing in mind the resources of Messrs. Harland and Wolff, Ltd., and the large number of skilled artisans continuously engaged, the immense character of the undertaking may be realized. Of course, to do such work in a completed ship necessitated an enormous amount of cutting out, drilling, etc., and the temporary displacement of machinery and fittings. This, in an iron structure of the strength of the *Olympic*, was necessarily a very tedious process, but the labour was greatly facilitated by the builders' special mechanical and electrical appliances, and particularly by the use of the oxy-acetylene cutting process, quite a number of which plants were employed in the cutting out. The wing boilers had to be removed to leave room for the riveters and platers to work at the inner shell, and to enable one of the boilers to be taken out of the ship the forward funnel and uptakes were temporarily removed. The auxiliary machine in the engine room and turbine room had also to be removed, and the ship's side valves and fittings, some of these valves weighing upwards of a ton. Consequently, the ship was entirely dismantled for the time being, which, of course, entailed a considerable amount of alteration to the pipes and fittings generally throughout the ship and the withdrawal of all the auxiliaries along the ship's side, including their seats and fittings, whilst

S.S. *Olympic*. General view of inner skin plating in boiler rooms.

General fore and aft view of outside of inner skin in 'tween decks S S. *Olympic*.

the placing of them further in involved additional labour. It may be mentioned also that as a further safeguard an extra line of piping of large diameter has been fitted, running right through the ship, enabling all the pumps to draw through this piping in case of emergency, so that any compartment can be pumped out by any of the bilge or ballast pumps, which are so arranged that in case of the valves being inaccessible through any contingency they can be operated from the upper deck.

The inner skin or shell is very strongly constructed so as to withstand heavy water pressure if necessary. The frames are of heavy channel steel, and the longitudinals giving increased strength to the structure extend the entire length of the double skin. The inner shell or hull, as it might be called, consists, of course, of strong steel plating. The space between the outer and inner shells has been specially subdivided, both vertically and horizontally, by retaining



View of inner skin looking through manhole, showing ships shell-plating and space between inner and outer skin.

View inside inner skin looking forward, showing water-tight space between ships' shell plating and inner skin plating.

the ship's original water-tight bulkheads out to the outer shell and the introduction of intermediate water-tight vertical divisions between the two shells, while the top or crown of the structure and upper longitudinal have been specially fitted as water-tight flats, so that each side of the ship has been converted into a series of water-tight compartments.

In the reconstruction that has been carried out the object in view has been to provide a margin of safety beyond all previously recognised standards.

Advantage has been taken of the time during which the vessel has been in the builders' hands to add still further to her attractiveness by the enlargement and redecoration of the restaurant, while, adjacent thereto, a large café Parisien has been constructed and a reception room in connection with the restaurant provided, adjoining the café Parisien and the first-class after entrance. Additions to the luxurious accommodation have also been made by the arrangement of suite state-rooms, with bath-rooms and lavatories, on the saloon and promenade decks, similar to those already in the ship, while additional cloak-room accommodation has also been provided on the promenade deck. It will also be interesting to many passengers to learn that comfortable and well-appointed dog-kennels have been provided on the middle deck for the accommodation of canine favourites.

Further, special attention has been paid to the heating and ventilation of the vessel, both natural and mechanical, also to the still further improvement of the accommodation for officers, engineers and crew.

Captain Haddock, R.N.R., is in command of the vessel, and Mr. R. H. Fleming, chief engineer, has been inspecting the work during the operations.

Q.S.T.S. "AQUITANIA."

Refrigerating Plant.—The refrigerating plant installed on the *Aquitania* is provided exclusively for the carriage of the ship's perishable provisions, and includes a very large and complete series of insulated chambers arranged on the "E" deck amidships. Separate chambers are provided for beef, mutton, poultry, fish, fruit, vegetables, milk, ice, bacon, cheese, wines, beer and minerals, all of which can be independently maintained at freezing or cool temperatures suitable for the goods carried in them. In addition there are in various parts of the vessel cold pantries, bar refrigerators, cold cupboards, water coolers for iced water, all of which are directly refrigerated by the machinery. The chambers and their details are of the most up-to-date description, everything being done to ensure the carriage of the ship's provisions in perfect condition.

The machinery, which is of the carbonic anhydride compression type, and is duplex throughout—one half of the plant being sufficiently powerful to do the whole of the refrigerating work—is placed immediately aft of No. 3 boiler-room under the turbo-generating room, in a spacious and well-ventilated compartment, which allows abundance of room for working and overhaul.

The compressors are horizontal and double-acting. They are two in number, of Webb & Others' patent design, having metallic packed pistons and independent and readily withdrawable liners supported in outer casings of steel. The compressors are driven from the tail rods of compound steam cylinders, the whole being arranged so that either side of the machine can work quite independently of the other, or both in combination, as desired. Two independent CO_2 gas condensers, of solid drawn copper tube, are fitted in the tank base under the machine. Two independent evaporators, three duplex brine pumps, a duplex water pump with auxiliary connections from the ship's pumps, and a very extensive and comprehensive system of brine distribution and control on the Liverpool Refrigeration Co.'s entirely closed system, are provided. Generally, the plant embodies the latest practice in marine refrigeration specially applied to the requirements of the largest modern passenger steamers. The whole of the outfit is being provided by The Liverpool Refrigeration Co., Ltd., of Colonial House, Water Street, Liverpool.

Electric Generating Plant.—The electric generating plant consists of four 400 kw. turbo-generator sets built and supplied by the British Westinghouse Co., of Trafford Park, Manchester.

The turbines are of this Company's well-known impulse type, designed to operate on steam at 150 lbs. per square inch gauge, and to exhaust into surface feed-water heaters against a back pressure of 20 lbs. per square inch absolute. Under these conditions, when supplied with dry saturated steam, the sets develop their rated power at 1500 r.p.m., and the official tests at the maker's works showed that the following guaranteed steam consumptions were easily obtained.

Full load	41·5 lbs. per kw. hour.
Three-quarter load	44·0 lbs. per kw. hour.
Half load	52·0 lbs. per kw. hour.

Each set was tested up to 25 per cent. overload under the above steam conditions.

The rotating element of each turbine consists of three forged-steel wheels, each carrying two rows of blades, all mounted on a stout steel shaft, connected to the generator shaft by a rigid forged coupling. Each wheel is machined all over and balanced before and after it is mounted on its shaft. The blades are of a high-grade nickel-steel machined from the solid and secured in T-head slots in the rim of each wheel. There are no loose distance pieces between the blades, each being shaped so as to form its own distance piece or spacer. A powerful centrifugal governor is fitted, and is driven from the main shaft by means of worm gearing. This worm gear also drives an oil pump for lubricating the main bearings. The electric generators are of the British Westinghouse Company's well-known "Radial Commutator" type, which has proved itself so successful in eliminating brush gear vibration and consequent damage to both the commutator surface and the brush gear.

The generators are designed to operate on a three-wire system, having 225 volts between outers. The mid wire connection is made through a balancing transformer and two slip rings mounted on the armature shaft. Large power motors are supplied with current at 225 volts, while smaller motors and lighting will be connected between the mid wire and the outers.

The advantages of this system over a straight 110-volt system are:—(1) The generators are smaller, lighter, cheaper, more efficient and less likely to develop commutator troubles if the output is high. (2) The switchgear and cabling costs are less. (3) The electrical losses in the cables are lower. (4) The voltage regulation in the cables is better. (5) Owing to the smaller currents carried, there is less danger of heating in joints. (6) The magnetic effects are reduced. Each generator is self-ventilating, powerful fans provided for that purpose drawing cool air in from special ducts and discharging it from the opening at the top of the yoke.

The accompanying illustration gives a good idea of the neat and workmanlike appearance of these sets.

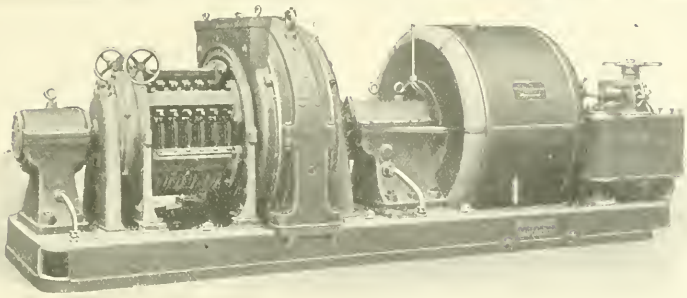
Electric Lifts.—The electric lifts of the *Aquitania* will be installed by Messrs. Smith, Major & Stevens, Ltd., of Northampton. In designing these lifts, the first consideration has been perfect safety in working. Each lift will be driven through Messrs. Smith, Major & Steven's well known Vee wheel system of drive, with which an "overwind" is an impossibility. Ten lifts will be fitted, as follows:—three first-class passenger lifts, two serving five decks, the other six decks; two second-class passenger lifts, and two large baggage lifts, all serving six decks; two stores lifts serving four decks, and one luggage lift serving six decks.

The Kitchens of the "Aquitania" are situated between the first and second-class saloon, and, with their pantries, service-rooms, bakeries and butchery, extend the whole width of the ship. The kitchens will undoubtedly surpass anything yet done in this department for ships' use and will be fitted with everything that experience and skill can suggest to provide the best of cooking. The appliances, which will be of the very latest type, and supplied by Messrs. Henry Wilson & Co., Ltd., of Liverpool, will include large island ranges, Wilson's patent roasters, silver grills, steam stockpots, steam ovens, clean steam producers, Bain Maries, and hot closets, also electrically-driven triturators, chopping and mincing machines. The sculleries and vegetable preparing rooms will contain "Cornhill" potato peeling machines, "Vortex" dish washers, and all the most up-to-date devices for saving labour in this division. Until recent years the bakehouse for ships did not receive the attention which it deserved, but in the *Aquitania* the bakehouse will compare favourably with anything to be found ashore, being provided with the popular Wilson-Werner baker's ovens, electrically-driven dough mixers, whisking, freezing and cake-making machines, with ample provision of cold boxes for ices, jellies, etc. There will also be a specially-designed oven for the use of the confectioner only. The pantries and serving-rooms will be an advance on anything hitherto attempted, either ashore or afloat. Placed in the most convenient positions will be large ranges of hot presses, Bain Maries, etc. Everything contributing to the smooth and rapid service of a high-class cuisine will be here, including such time and labour-saving machinery as electrically-driven slicers, coffee mills, knife-cleaning machines, etc. In short, every effort has been made to make the kitchens perfect, and no pains have been spared to ensure the preparation of food under hygienic conditions.

The Cunard Company have always enjoyed the reputation of being very thoughtful of their third-class passengers, and nowhere is the care and foresight of the firm better illustrated than in the third-class kitchens of the *Aquitania*. The plant provided is of such a kind that it will be capable of producing food which was not equalled by the first cabin table of an earlier period.

Carruthers Pumps.—Messrs. J. H. Carruthers & Co., Ltd., of Polmadie, Glasgow, have supplied a number of their well-known pumps to the *Aquitania*, which consist of the sanitary, fresh water, ballast, fire, bilge and water service pumps, and are ten in number. These pumps are of the vertical duplex type with gun-metal water ends, and have been built to a very high-class specification with adjustable valve gears and United States Metallic Packing.

Bulkhead Doors and Ash Expellers.—The *Aquitania* is rendered practically unsinkable by means of the bulkhead doors being operated hydraulically by the "Stone-Lloyd" system, which is fitted in all the latest crack



400 k.w., 225 volt., 1500 r.p.m Turbo Generator Set Four sets have been supplied by The British Westinghouse Electric and Manufacturing Co., Ltd., for the *Aquitania*.

liners belonging to the Cunard Company. By the movement of a lever on the bridge, the navigating officer will be able to close the bulkhead doors simultaneously by hydraulic pressure, thus rendering every bulkhead absolutely watertight. Communication between the various compartments will, however, still be possible by reason of the fact that each door can be locally opened, but not left open, while the closing pressure is on from the bridge. The whole of the ashes produced in the vessel will be discharged beneath the waterline by Messrs. Stone's patent hydraulic Underline Ash Expellers.

Side-Lights.—A number of side-lights for the *Aquitania* have been supplied by the Carron Company, of Carron, Falkirk.

Messrs. Wailes, Dove & Co. inform us that their patent "Bitumastic" covering has been used in the *Aquitania*, and has been applied to the tank tops in the engine and boiler-rooms, auxiliary machinery and condenser rooms, and their patent "Bitumastic" enamel to the double bottom water-ballast tanks, bunkers and anti-rolling tanks. The suction and discharge chests and suction valves and a large amount of piping are coated with patent "Bitumastic" solution.

REVIEWS.

The Germanischer Lloyd's Register of Shipping for 1913 has recently been issued and may be obtained from the Offices of the Registry in Berlin. The register deals with all vessels classed with the Germanischer Lloyd and all German vessels measuring above 50 gross register tons. All necessary parts of the publication are in German, French and English, so therefore it is easy for those not understanding the German language to follow the particulars given. A large amount of tabular matter is contained in the publication and in addition to the general list of vessels there are lists of the agents and surveyors of the Society arranged according to ports in one list and according to countries in another. The technical surveyors of the See-Berufsgenossenschaft are also given. Further lists are given at the end of the volume of vessels having (1) appliances for simultaneous closing of all bulkhead doors from above deck, (2) with cargo refrigerating appliances, (3) apparatus for the application of fire extinguishing gases, (4) submarine signal receiving apparatus, and (5) apparatus for wireless telegraphy. Other lists deal with vessels whose names have been changed—German shipowners with their ships, etc., etc. For the first time a separate section is reserved for vessels fitted with internal combustion engines and as it is evident that each year will witness an increase in vessels so driven, the use of such a section devoted to this mode of propulsion will be apparent. The Germanischer Lloyd has in its service 103 agents and 175 surveyors, and of these 227 are stationed abroad and 51 within the German empire.

Fergusson's Percentage Compass. London: Longmans, Green and Co. Unmounted, 2/6 nett; mounted, 3/6 nett.

THIS is a diagram worked out on Fergusson's system of angular measurement by logarithms which was fully described in a volume published some time ago and including reference tables and data for the use of those who frequently require to lay down plans from observations taken by surveying instruments. The system in question admits of such plans being laid down by reference to the tables, thus saving much time and many calculations, and so by the great labour of one the labour of the many is lessened and the advantage is also a great one to the busy man, as is the slide rule and the diagram area recorder. The Percentage Compass is an application of the system to the mariner's compass and by reference to it, observations made can readily be converted into distances run with the corresponding deviation and the result of several courses summed up with the minimum of calculation, by simple arithmetic. Three circles termed A, B and C, are embraced in the sheet. The inner one A is the compass card divided into 360 degrees; the second B is divided into percentage units, and the outer one C gives a table of natural percentage cosines. An example is given showing how the tables are applied to work out the result of the setting of three courses, thus illustrating graphically the handiness of the method, based upon the system on which the whole is constructed. It will be found a very desirable addition to the chart room and to those who are interested in tracing the vessel's progress through the waters.

The Indicator Handbook. By Charles N. Pickworth, Wh. Sch. London: Whittaker & Co. and Emmott & Co., Ltd. Price 3s. net.

THIS is a fifth edition of this useful work which is part II. of the original book on "The construction and application of the indicator," by the same author. In resetting the text for this edition extensive revisions have been carried out and material additions have been made to the contents. Particular attention has been given to the chapter dealing with diagrams on gas and oil engines, not only by extending largely the information in the text, but by the inclusion of some twenty additional illustrations. The utility of the original work has been largely recognised in the past, and we feel sure that this new edition with its revisions and extension will appeal to an increasing number of those who require a concise and handy book on the subject.

Kelly's Customs Tariffs of the World, 1913. London: Kelly's Directories, Ltd., High Holborn. Price, 10/- nett.

THE present edition of this really useful publication extends to over 1,100 pages in double columns. The arrangement of the work is so simple that with the help of the general index and of those given at the commencement of the different countries the duty on a particular article levied by any particular country can be ascertained in a moment. The book is therefore a really invaluable one for export and import merchants and manufacturers. It is the most complete work ever published of the various Customs Tariffs in force throughout the world and is intended to meet a real and distinct need in the commercial and industrial world. It should be mentioned that tariffs are subject to constant alterations and amendments and no year passes without some being wholly remodelled. In the present volume, new tariffs among others have been added for Costa Rica, Salvador, Panama, Libya (Tripoli and Cyrenaica), etc.

THE FLEETS OF THE MAIL LINES.

(From our own Correspondent.)

An Interesting Part

of the speech of Mr. R. White, the chairman of the General Steam Navigation Company, at the Company's annual general meeting the other day, dealt with the reasons which prompted the Board to dispose of the turbine-engined steamship *Kingfisher*—a vessel which is now winning golden opinions under a new name in continental waters. The Board of the General Steam Navigation Company found that the passengers for whom they cater like to embark for their trips at London Bridge and travel down the river by water, the idea of going down by train to Tilbury not appealing to them. Thus the original intention of the Board, which was to despatch the *Kingfisher* from Tilbury, could not be carried into effect. For the navigation of that part of the Thames which lies between Tilbury and London Bridge the management did not consider a screw steamship suitable, and so the *Kingfisher* was no longer of any use to them, and she was sold. It seems a strange thing at this time of day, when the paddler has disappeared from the narrow seas as well as from the ocean, and when even the better class of steam tugs have taken to the screw that a company such as the General Steam Navigation should revert to the older method of propulsion. But there the statement is. We do not fancy, however, that the conditions which make in favour of the resuscitation of the paddle wheel will be found in many other trades than that of the excursion traffic of this one company.

The Newhaven and Dieppe Route

continues to add new turbine vessels to its fleet. The latest addition, the *Paris*, has been made by the British side of the partnership which jointly works the service. Messrs. Denny launched the new vessel on the 12th April and the event is noticeable for two reasons. First of all because the new ship has the geared type of Parsons turbine engine which has already proved its efficiency in the new ships of the London and South-Western Railway, and secondly because it shows that those who are charged with the management of the service are not allowing the development of the passenger fleet to stand still because of the suggestion that in the near future there may be a Channel Passenger Ferry between the two ports. Channel ferries are, of course, no new thing outside the British islands and the services round their coasts. In the Baltic and on the route between Germany and the Scandinavian countries, the mail and passenger trains are sent to sea in steam ferry boats every night of the year. Long stretches of open water are served by them on the great American lakes, and Canada is about to inaugurate one for the purpose of connecting the Newfoundland Railway system with that of the mainland. As has from time to time been noted in this column, there has long been a desire to establish such a ferry between Dover and Calais, and Parliamentary powers have been sought to enable the purpose to be effected. But somehow the railway interest at Dover—which also of course commands the present fleet—has been against the project and it has been shelved. Now an attempt is being made to transfer the place of the proposed ferry from Dover to Newhaven and negotiations are proceeding to induce the French Government—who own the railway between Dieppe and Paris—to give their assent and assistance to the plan. But though this attempt is being made it is evident that the Brighton Railway is not trusting solely to that for the popularity of its route and it is taking care that its fleet of ordinary passenger steamships shall be fully equal to the exacting requirements of the day.

Wireless Telegraphy

is being rapidly extended over the world. A station has recently been opened at the Russian port of Libau and it is now being urged that an installation is greatly needed on the island of Minicoy, distant some 417 miles from the port of Colombo and in the direct track of the steamships which ply between that port and the entrance to the Red Sea. The provision of a wireless station at Minicoy would enable the business community of Colombo to be advised of the approach of vessels from the westward, and would thus immensely facilitate the work of shippers and agents, who would be enabled to make exact arrangements as to the handling of cargo and coal as soon as the ships came into port. Mail steamships, of course, carry their own wireless equipment and can themselves advise the station at Colombo of their proximity and of the probable hour of their arrival. But it appears that even now no less than 75 per cent. of the steamships using the port are not fitted with wireless, and it is on behalf of this important section that the movement in favour of the installation is pressed. Moreover the island of Minicoy has rather a bad reputation, there having been a full half dozen steamships wrecked there within the last few years and the proposals now made might be greatly to the advantage of shipowners and underwriters—to say nothing of passengers and crews of unfortunate vessels—in case of further disasters at the spot.

The "Dunnottar Castle."

This well-known Castle liner has, it is reported, now been sold out of the Union Castle fleet. Built at Glasgow by the Fairfield Shipbuilding Company in the year 1890, about the time that the Union Company turned out the famous *Scot*, she was for many years a favourite in the passenger and mail service to the Cape, being of the then vast tonnage of 5,625 tons gross register. But she has long been relegated to the background by the advent of vessels each larger and more luxurious than the last, till now there are steamers on the station nearly three times her size. It is now many years since she made a trip in the mail service. After lying for some years off Netley as one of the reserve ships, she was chartered to Sir Henry Lunn as a public yacht and attained a considerable measure of popularity in that employment. That arrangement has, however, now terminated and the Union Castle Line, to whom she has been returned, have no use for her. So she has been cast from the fleet. Perhaps the vessel will be best remembered by the famous cruise, to which the late Sir Donald Currie invited a distinguished party of guests, instead of making the usual trial trip. The voyage was made through some of the most romantic parts of the western islands of Scotland and a permanent souvenir of the occasion was afforded by the publication of a book which not only described the incidents of the voyage, but contained many beautiful illustrations from drawings by various members of the party. Amongst them the late Dr. Lennox Browne afforded the public evidence that if he had not been a great surgeon and throat specialist, he might have gone down to fame as a black and white artist. Two casualties to the *Dunnottar Castle* may be mentioned. One was her stranding on the Eddystone rock by a mistake of the pilot when making for Plymouth on her homeward voyage in a heavy fog, and the other was a machinery breakdown when she had to take assistance for towage into port.

Disasters.

It is a strange coincidence that two important cargo vessels should have been lost within a few days of one another off the coast of South Africa at the end of March. The first casualty was the stranding of the Norwegian steamship *Hektor* at Dyer's Island, near Cape Town, in a heavy fog. She had a cargo of steel rails from a North American port and from the first it was seen that there was no chance of any salvage of ship or cargo, but fortunately there was no loss of life. The vessel was built as recently as the year 1905 at Sunderland and was not far short of four thousand tons gross register. The other vessel was the *Camphill*, of Glasgow, a vessel of a slightly larger tonnage than the *Hektor*, and built a year later than she at Stockton by Messrs. Ropner's. She was carrying a valuable cargo of rice from Rangoon to the River Plate, when she struck off Cape Aghulas and tore her bottom out. The unfortunate thing about this casualty was that, by the bursting of a steam pipe in the engine-room when the vessel struck, Mr. Ross, the second engineer, Mr. Heywood, the fourth engineer, and a Chinese fireman, were killed at the post of duty. In this case too it has been found that there is no possibility of any salvage.

The loss of the *Eastwell* at Ymuiden was a most unsatisfactory business. This was quite a new vessel of over 5,000 tons gross register, built at Sunderland last year. By stress

of weather she was driven on the north pier when entering the port of Ymuiden, and sank, blocking the entrance. The authorities naturally insisted on the fairway being cleared, under threat of blowing the ship up. An attempt was therefore made to conclude a contract with a salvage company which had a vessel in the neighbourhood. But terms which were acceptable to both sides could not be reached, and so the ship had to be left to her fate, the Harbour Board proceeding to disperse her. This vessel, like the *Camphill*, carried a valuable rice cargo.

Attention has been Called

in the general press to the fact that a British firm which has placed orders for four high-class steamships of about 10,000 tons apiece, has given the contracts for three of them to a French firm at Dunkirk. Various reasons have been advanced to account for this unusual state of things. A writer in the *Times*, speaking with some authority as a shipowner, suggests that the true reason is that under present circumstances no reliance can be placed on the due delivery of vessels ordered from British yards, because the recent advances in the wages paid in shipbuilding yards have made the men, especially the riveters, disinclined to work more than, say, four days a week, since under the new scale of wages they make as much in that time as they formerly did in five days and a half. In addition to this there is the discouragement of the Unions of the practice of working overtime, and thus the British rate of output is slowed in comparison with that of foreign yards.

The "Snowdon Range."

What is probably the last incident in connection with the breakdown of the *Snowdon Range* in December, 1912, and the subsequent adventures of the vessel, has now concluded. The Admiralty Court has heard the salvage suit brought against the ship and her cargo by the owners of the steamship *Salome*, which first attempted to salve her, and those of the Dominion liner *Welshman*, which, abandoning her own voyage to Portland, Maine, towed the disabled ship back to the Irish coast. The value of the *Snowdon Range* and her cargo at risk was put at £92,000, and the Court made an award to the salvors of £10,000. Of this sum £450 was given to the *Salome*, a vessel which, though exceedingly well intentioned, had not the size and power to be of much use under such extraordinary circumstances as those which were encountered; £7,850 was given to the owners of the *Welshman*—who, of course, were out of pocket by the abandonment of the voyage, as well as by the usual expenses of salvors by towage—whilst apportionment was made as to £500 to the master and £1,200 to the crew.

LOAD-LINE COMMITTEE.

THE President of the Board of Trade has appointed a Committee to advise him as to the attitude which should be adopted by the British representatives at the forthcoming International Conference on Load-line, and for that purpose to enquire and report whether, and if so in what respects, the Tables of Freeboard revised in 1906 need further revision in the light of the experience gained since that date of their practical working and effect.

The Committee is constituted as follows:—Sir Philip Watts, K.C.B., F.R.S. (chairman), Adviser on Naval Construction, Admiralty; Westcott S. Abell, Esq., Professor of Naval Architecture, University of Liverpool; W. David Archer, Esq., Principal Ship Surveyor, Board of Trade; Archibald Denny, Esq., LL.D., chairman of the Committee on Bulkheads and Water-tight Compartments; John Gravell, Esq., Chief Representative for the United Kingdom, Bureau Veritas; J. Foster King, Esq., Chief Surveyor, British Corporation for the Survey and Registry of Shipping; Sir William E. Smith, C.B., late Superintendent of Construction Accounts and Contract Work, Admiralty; S. J. P. Thearle, Esq., D.Sc., Chief Ship Surveyor, Lloyd's Register of British and Foreign Shipping; Captain A. H. F. Young, Professional Member of the Marine Department, Board of Trade.

The Secretary to the Committee is Mr. C. J. O. Sanders, of the Board of Trade, 7, Whitehall Gardens, London, S.W., to whom all communications relating to the work of the Committee should be addressed.

FOREIGN NOTES.

Holland.

FROM the shipyard of von Wortelboer & Co., at Westerbrook, an elevator and lighter of 850 tons to the order of Dutch merchants has just been launched.

The steamer *Houtmann* was launched at the shipyard of the Niederl. Schiff. Ges. at Amsterdam, where she has been built to the order of the Royal Packet Steamship Company. The *Houtmann* is of 8,775 tons and is provided with first and second class passenger accommodation, fitted up with all modern requirements suitable for the tropical service between Java and Australia.

Italy.

The shipyards of "Pattison" at Naples and "Odero" at Genoa have received orders from the Admiralty for the construction of ten destroyers of 680 tons of the improved *Indomito* type.

The Ansaldo shipyard is constructing three destroyers of 1,000 tons each for the Admiralty.

The battleship *Andrea-Doria* was launched on the 29th March at Spezia and the sister ship *Duilio* is to be launched at the end of May at the Castellamare shipyard.

The cargo steamer *Isabelle* has just been launched by the Chantiers de la Loire, where she was built to the order of the Compagnie Auxiliaire de Navigation. Her length is 91 m., beam 13 m., and she is of 3,800 tons. Her engine will develop 1,200 i.h.p. The *Isabelle* is to be used for the transport of coal.

The shipyard of "Odero" at Genoa has received an order for two large passenger steamers from the Hamburg-America Line. They are to be fitted with powerful machinery to secure a high speed, and the accommodation for passengers is to be of quite an exceptionally comfortable style. The equipment will include electric lighting, refrigerating compartments, a wireless plant, and special attention is to be devoted to the provision of ample boat space for all on board. The completion of these two vessels is to be hurried forward as much as possible.

Germany.

The cargo and passenger steamer *Lauterfels*, built at the Weser shipyard at Bremen to the order of the Hansa Steamship Company at Bremen has been put through her trial runs, when she successfully attained the contract speed of 11½ knots. She is 128 m. long, beam of 17 m., and has a carrying capacity of 9,000 tons. The *Lauterfels* is equipped with a triple-expansion engine of 2,500 i.h.p. Her accommodation is thoroughly up-to-date and she is fitted up with all modern requirements, including electric lighting, refrigeration and a wireless installation for long distances. The same Company has placed further orders with the Weser shipyard, totalling twelve large cargo and passenger steamers of 9,000 to 12,000 tons to be delivered in the course of the next three years.

The Woermann Line at Hamburg is amalgamating with the Messageries fluviales du Congo in Paris, with the co-operation of the Deutsche Bank at Berlin, to form one large German Steamship Company, under the name of the Kamerun Company, for the purpose of the opening up and development of the German Cameroon territories in West Africa.

The *Alda* was successfully put through her trial runs by the Tecklenborg shipyard, where she has been built to the order of the Roland Steamship Company, at Bremen, which immediately took over the *Alda* on completion of her trial run. Her length is 146 m., beam 18 m. She is equipped with a quadruple-expansion engine of 3,800 i.h.p. and the speed she attained was 12½ knots. She is fitted with all modern requirements, electric lighting, a Telefunken wireless plant, with a complete outfit of all auxiliary machinery to deal with the cargo.

The *Wachtenfels*, built to the order of the Hansa Steamship Company, of 9,000 tons, has been launched at the Flensburg shipyard.

The battleship *Ersatz Kurfürst Friederich Wilhelm* is to be launched on the 3rd May at the Vulkan shipyard at Hamburg. The ceremony of christening the vessel is to be performed by Prince Oskar, representing the German Emperor.

The airship establishment is being rapidly pushed forward at Cuxhaven, a large hangar, to accommodate two airships of

180 m. length, 15 m. width, and 2.5 m. height, is being erected, besides gasworks and barracks for the men employed there.

At the shipyard of the Bremen Vulkan at Vegesack, near Bremen, the *Pommern* was successfully launched, where she has been built to the order of the North German Lloyd. Her length is 149.3 m., beam 17.08 m., and on a draught of 8.2 m her carrying capacity will be 11,000 tons. The *Pommern* is equipped with twenty derricks and winches to deal with the cargo. She will be propelled by triple-expansion engines of 4,500 i.h.p., which will give the vessel a speed of 12½ knots. Four boilers provided with Howden's forced draught system will supply the steam for the engine and auxiliary plant. Refrigerating compartments are fitted and the equipment of the *Pommern* further includes electric lighting for the entire vessel, a wireless plant and a submarine sounding apparatus. The same shipyard has six other steamers in course of construction for the same Company.

The cargo steamer *Hedwig*, built to the order of the German East Africa Line, of 700 tons carrying capacity, has been completed at the Stulken shipyard. She is destined for the Coastal Service and her speed is to be 8½ knots.

Russia.

The Admiralty has placed orders for two motor tank vessels, the motors of which are to be supplied by the firm of Krupp.

Austria.

On 8th April was launched by the Cantiere Navale Triestino the passenger steamer s.s. *Belvedere*, built for the Austro-Americana Trieste, especially for emigrants. The dimensions of the vessel are as follows:—Length, 418 ft. b.p. and 434 ft. overall; breadth, 54 ft overall; depth, 20 ft. to upper deck. The emigrants will be quartered on the upper and shelter decks. The displacement of the vessel loaded will be 13,500 tons and her speed about 15 knots. The propelling machinery, which consists of one triple-expansion engine, will be built by Messrs. David Rowan & Co., of Glasgow. Wireless apparatus will be installed and all other modern life-saving appliances for passenger steamers as per the rules of the Board of Trade.

On 20th March was delivered from Messrs. Stabilimento Tecnico Triestino to the Austrian Navy the second Austrian Dreadnought *Tegetthoff*. The dimensions of the vessel are—Length, 500 ft.; breadth, 89 ft. 6 in.; draught, 27 ft., and the displacement 21,370 metrical tons. The armour protection at water line for four-fifths of the vessel's length is 11 in. of special nickel steel. Deck, 1½ in., turrets 12 in., lower deck side 7½ in., and she will carry twelve 12-in. guns, twelve 6-in. guns, eighteen 12-pds. and maxims; four submerged 21-in. torpedo tubes are supplied. The propelling machinery consists of two Parsons turbines developing 25,000 h.p., and the boilers number twelve, of the Yarrow type. The speed on trial was 21·5 knots. The *Tegetthoff* is a sister ship of *Viribus Unitis*, delivered last year, and of *Prinz Eugen*, launched this year. This latter vessel was laid down April, 1911, and launched 21st March, 1912, and forms a record for the Stabilimento Tecnico Triestino, eclipsed only by the best English shipyards. All material for hull and engines has been supplied by Austro-Hungarian industries. A similar battleship is in construction by Cantiere Danubius dis Fume.

France.

The passenger and cargo steamer *Lutetia* was recently launched by the Chantiers de l'Atlantique, where she has been built to the order of the Navigation Sud-Americaine at Marseilles. Her dimensions are—length, 599 ft. 5 in.; beam, 64 ft. 3 in., and she will have a carrying capacity of 14,400 tons. She has accommodation for 300 passengers of first, 106 of second, 80 of third-class and for 600 emigrants. The propelling machinery of the *Lutetia* will be two triple-expansion engines and two turbines, and the speed of the vessel 20·5 knots.

Belgium.

Owing to the political questions which have been causes of disturbance for some time, and which have become more acute during recent elections of Representatives to the Legislative Assembly, the condition of the industries of Belgium has fallen considerably below the normal. Trade and commerce are suffering while the controversy proceeds as to the number of votes each man is entitled to according to the stake he holds in the country, from an educational or property point of view. The increasing prosperity of Antwerp has been checked, and its commerce affected by the strike, which was proclaimed to be universal with a view to coerce legislation, and although the result has not been so widespread as aimed at, yet the effects have been unfortunate. The strike of last year among turners and other tradesmen in Antwerp led to considerable loss to all hands. Hence the present state of "declining to work" is all the more deplorable. The tariff rates for sailing vessels and steamers using the Antwerp dry docks has been published and issued by Messrs. Belard and Crighton, Batavia Street, in a very complete and handy booklet. The rates are shown according to the tonnage and number of days the dock is occupied. Along with this is issued a statement showing the nationality and number of vessels, each month of 1912, which have been overhauled and repaired by the firm in the dry docks; these amount to 168 during the year. The illustrations are interesting and show the branch works of Messrs. Belard & Crighton near the docks, each dry dock being shown occupied.

ENGINEERS-IN-CHARGE.

THIS Institution held its 18th annual dinner in the King's Hall of the Holborn Restaurant on Saturday, the 12th of April, when the President of the Association, Professor H. S. Hele-Shaw, D.Sc., LL.D., F.R.S., M.I.C.E., M.I.M.E., took the chair and presided over 300 members and guests present. After the usual Royal toasts, the toast of "The Engineering Profession" was proposed by the Agent-General for New South Wales, T. A. Coghlan, Esq., C.I.E., and was responded to by Sir Hay. F. Donaldson, K.C.B., the superintendent of the Ordnance Factory at Woolwich. The next toast of "The Kindred Institutions and Our Guests," was proposed by the Honorary Secretary of the Association, Mr. Alfred E. Penn, and was responded to in a humorous speech by his Honour Judge Rentoul, K.C., LL.D., in his usual interesting strain. The last toast, *viz.*, that of "The Association," was proposed by Sydney Brooks, Esq., and responded to by the President. In addition to the speeches a very excellent musical programme was provided and a most successful evening was spent. The collective responsibility resting on the members represented by the company present during the evening is much larger than what at first sight might appear from the title of the Institution, but it must be remembered that the gentlemen who are members of this Association are in charge of very extensive works, laid out at the expenditure of a large amount of capital in concerns owned by the Government, by municipal and other large corporate bodies all over the world. Not only does the Association provide very useful and interesting matter of a technical character for the education of its members, but at the same time it has certain social features in its programme which afford such excellent means for creating good-will and fellowship amongst the members and their friends, and in this way particularly renders great benefit to the members of the particular branch of engineering in which the members are engaged. We feel sure that the Institution will continue to progress in the same sure, steady and progressive manner as it has done since it was inaugurated.

SHIPWRIGHTS' COMPANY.—At a meeting of the Educational Trust Fund Committee held April 17th, the Master (Mr. J. Bell White) presiding, Sir Philip Watts, K.C.B., F.R.S., was unanimously elected Chairman of the Committee in the place of the late Sir W. H. White, K.C.B., F.R.S., Mr. T. L. Devitt was unanimously elected Treasurer, and Mr. Arthur D. Hansell, solicitor, of 14, Gray's Inn Square, W.C. (Clerk to the Shipwrights' Company), was elected Secretary in the place of Mr. H. W. Sewell, resigned. The late Sir W. H. White (Past Master of the Company) was the Founder of this Fund, which has for many years enabled most useful educational work to be carried on, mainly by the establishment of scholarships throughout the country for promising and deserving young Naval Architects. It was resolved by the committee to take steps to place the Fund on a substantial permanent footing as a memorial to its late Founder, who had devoted so much fostering care and attention to the promotion of technical education in connection with the Shipwrights' Craft.

BUILDING TRADES EXHIBITION.

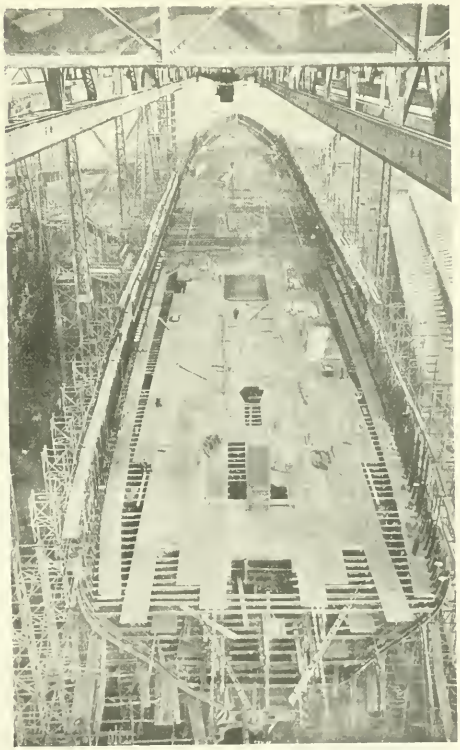
THIS exhibition, open from April 12th to 26th, was well arranged and formed a pleasant interlude for the visitor much engrossed in the hard technicalities of his own particular business, and yet desirous of seeking a recreative study of the business of those who add to the comforts of home life. Yet there were many exhibits of interest to the engineer and valuable for him to know. The paint manufacturers were well represented, the samples of colours, specimens showing various shades of paint on stone, metal and wood; protective and antifouling compositions; each and all were well worthy of close examination and study, and to add to the interest the explanations culled from the experience of those in charge were freely given to enquirers. The different kinds of structures for houses and buildings formed an important section, and not only were there complete buildings, but portions and sections, with practical illustrations or demonstrations showing the mixing and the moulding process where the materials were formed into a composite or concrete. The latest methods for heating and ventilating of houses and buildings were very well illustrated, and the assortment of grates and cooking ranges was not only large, but varied, from the simple to the complex and elaborate. Roofing and flooring materials of many kinds were brought to our notice as well as waterproof linings, some of which appeared both durable and efficient for the purpose intended. Steel doors, safes, shelves and shutters with all the necessary fittings and connections were on view. Petrol gas plants in operation showed the lighting capacity and power of petrol. The appliances and general arrangements in connection with sanitation showed the attention paid to the details of such in these days when we are surrounded by a network of regulations which threatens to envelop if it does not crush. There were many things in the exhibition which might be illustrated with advantage, and several firms whose names might fittingly be recorded for the excellence of their manufactures. Among these latter may be mentioned Messrs. H. Gay & Co., paint manufacturers, who devote themselves specially to ship work, and among the former a neat electric drill which seemed a very handy tool and simple to manipulate.

DIAMOND STEAM FLUE BLOWERS.

THE use of these blowers for cleaning boiler tubes appears to be rapidly extending, thus giving evidence of efficient service and satisfaction to those who have had experience of them. The list of the shipping companies whose steamers are fitted with the blowers embraces most of the leading lines, while in addition the large number of engineering firms included among the customers of the Diamond Blowers Co. is evidence of appreciation on the part of the builders, who are also interested in getting the best results possible out of the machinery with a view to repeat orders. The advantage of being able to clean tubes without opening the smoke-box doors is obvious, and the use of the steam for the blower is more than compensated for by the advantages thus gained; the dropping of the steam pressure by cooling the heating surfaces through the open doors being prevented and the deteriorations of the tube end and joints being obviated by maintaining a more uniform temperature and avoiding the inrush of unheated air. Generally speaking, there is an objection to use steam for purposes which necessitate its absorption, and expedients are adopted to secure its water equivalent from every lb. of steam, fresh water being valuable, but the amount of steam required by the blowers, judiciously used, is small, and compared with the equivalent value the loss of steam is as nothing to the gain in economy and upkeep, especially as it is stated that reports from steamers, after making voyages, fitted with the blowers, show a considerable gain in speed, a gain which may be readily attributed to the difference arising from the cleaner surfaces and better steam, due to the removal of soot, as the sixteenth of an inch deposit causes a loss of full 20 per cent. conductivity.

HAMBURG-AMERICA LINER "VATERLAND."

This vessel, which is being built for the trans-Atlantic service, was launched from the yard of Messrs. Blohm & Voss at Hamburg on April 3rd, the christening ceremony being performed by Prince Rupprecht, of Bavaria. Her keel was laid in September, 1911. The *Vaterland* is a sister ship to the 50,000 tons *Imperator*, excepting that she is said to have an increase of 4,000 tons. She will be able to accommodate a crew of 1,200 men and 4,050 passengers, and has the most modern arrangements for protection against fire or sinking. She carries eighty-three lifeboats instead of seventy, two of which are motor boats. Her four forward turbines, revolving at the rate of 180 revolutions per minute, will develop 61,000 horse power, and the average speed of the vessel is expected to be 22½ knots. It is stated that the *Vaterland* has practically the same beam as that of the *Imperator, viz.*, 98 feet, but that she is of greater length than the latter, which is reported to be 919 feet over all.



Hamburg-American Liner *Vaterland*, launched from the yard of Messrs Blohm & Voss, Hamburg, 3rd April, 1913.
The vessel is said to be over 919 ft. in length, that is longer than the *Imperator* and *Aquitania*.
The illustration shows a deck in course of being plated.

The Hamburg-American Liner, *Vaterland*, launched 3rd April, 1913. The vessel will have a speed of 22½ knots.

BOARD OF TRADE EXAMINATIONS.

MARCH 20th, 1913. LONDON. *1st Class:* A. Cunningham, J. Love. *2nd Class:* W. Ralston, S. Woodrow.

GLASGOW.—*1st Class:* R. Kaklcke, J. Munro, W. Oliphant, A. Paxton, A. Reddock, W. Scott, J. Tillie. *2nd Class:* S. Crawford.

WEST HARTLEPOOL.—*1st Class:* F. Johnson, A. Oswald, J. Turnbull. *2nd Class:* R. Adamson, V. McHard, W. Pearson, A. Spence, J. Williams.

NORTH SHIELDS.—*1st Class:* M. Noon, C. Ross. *2nd Class:* A. McFarlane, R. Turner.

SOUTHAMPTON. *1st Class:* P. Campbell, G. McColl. *2nd Class:* A. Ferguson.

LIVERPOOL.—*1st Class:* J. Ekbery, G. Griffiths, W. Harper, F. Harris, A. Jones, G. Lees, M. Thayer. *2nd Class:* T. Beattie, T. Cookson, J. Ellwood, W. Manson, H. Thomas, P. Thoroughgood.

CARDIFF.—*1st Class:* D. Edmunds, W. Inson, A. Thorne. *2nd Class:* C. Lee, J. Stevens, W. Williams.

LEITH.—*1st Class:* G. Mackay, T. Smith, G. Stark. *2nd Class:* A. Allan, C. Barlow, W. Frew, M. Halcrow, D. Macadie.

MARCH 27th, 1913. LONDON.—*1st Class:* H. Edwards, P. Hussey, J. Jackson, C. Lobb, W. Plowman. *2nd Class:* W. Aylward, E. Gent, E. Melvin, S. Reynolds, F. Ruse, W. Shadrake, A. Smith.

GREENOCK.—*1st Class:* J. Blackmore, T. Fairbairn, J. Gray. *2nd Class:* G. Donald, T. Gibson, J. Shields, A. Young.

ABERDEEN.—*1st Class:* R. Cameron. *2nd Class:* J. Davidson.

SUNDERLAND.—*1st Class:* W. Denton, *2nd Class:* T. Maxfield, N. Robson.

LIVERPOOL.—*1st Class:* H. Baile, G. Churchward, S. Fraser, P. Greener, W. Jones, A. Roberts, E. Sutherland, H. Taylor, J. Wright.

HULL.—*1st Class:* J. Parry, J. Whelan. *2nd Class:* H. Crust, B. Dales, J. Suggit.

NORTH SHIELDS.—*1st Class:* G. Dunning. *2nd Class:* J. Abbot, T. Hall, S. Moody, T. Smith.

BRISTOL.—*1st Class:* D. Morgan. *2nd Class:* R. Bree, W. Sott, C. Shepherd.

APRIL 3rd, 1913. LONDON. *1st Class:* W. Davies, E. Kite, J. Hodge. *2nd Class:* J. Annal, R. Collins, W. Merchant, H. Rose.

NORTH SHIELDS.—*1st Class:* W. Adams.

GLASGOW.—*1st Class:* D. Aitken, J. Craig, D. Martin, W. Templ , R. Yorston. *2nd Class:* A. Clark, A. Keil, A. Kennedy, D. Kennedy, H. McCririck, H. Tate.

FALMOUTH.—*2nd Class:* W. Webb.

LIVERPOOL.—*1st Class:* A. Inniss, J. Neale. *2nd Class:* A. Cowley, H. Johnson, J. McCulloch, R. Miller, A. Newman.

LEITH.—*1st Class:* G. Clark, H. Newell, D. Watson.

BELFAST.—*1st Class:* L. Campbell, R. Symes.

SOUTHAMPTON.—*1st Class:* C. Bartlett, J. Lewis. *2nd Class:* S. Hutchings, W. Mabb.

CARDIFF.—*1st Class:* A. Davies, J. Evans, R. Randell. *2nd Class:* W. McLeod.

APRIL 10th, 1913.—LONDON.—*1st Class:* J. Jones, R. Padbury, F. Pearson, A. Scrutton. *2nd Class:* W. Crawford, W. Morgan, A. Roberts.

GREENOCK.—*1st Class:* W. Boyes, E. Fitzcharles, W. Hart, A. Lochhead, J. MacDonald, W. Melvin. *2nd Class:* W. Fraser, G. Hovell.

HULL.—*1st Class:* S. Sibree. *2nd Class:* W. Griffin.

DUNDEE.—R. Hendry.

LIVERPOOL.—*1st Class:* E. Barclay, H. Macdonald. *2nd Class:* W. Barton, L. Flood-Jackson, A. Glendinning, G. Jones, A. Roberts, E. Skillicorn.

NORTH SHIELDS.—*1st Class:* A. Bryce, T. Hetherington, W. Langdon, B. Palmes, J. Rhynas, J. Thornicroft, H. Watson, G. Wilson. *2nd Class:* J. Morgan, S. Tyson, H. Wilson, W. Wilson.

APRIL 17th, 1913. LONDON.—*1st Class:* C. Harwood, J. Jamieson, B. Potter. *2nd Class:* D. Ralston, B. Tibbs, W. Young.

CARDIFF.—*2nd Class:* A. Herman, J. Jones, N. Manders, E. Tuckey.

GLASGOW.—*1st Class:* J. Lockhart, T. Peden, A. Ramsay, J. Steele. *2nd Class:* D. Dunn, A. Jeffrey, J. Jeffrey, J. Murdoch, H. Murchie, W. Robb.

LIVERPOOL.—*1st Class:* W. James, W. Lulham, W. Potts, R. Thomas. *2nd Class:* D. Christian, W. Gaskin, T. Jones, H. Smith.

NORTH SHIELDS.—*1st Class:* T. Alderson, R. Rossiter, J. Williamson. *2nd Class:* D. Bowman, A. Carnall, S. Miller, J. Young.

SOUTHAMPTON.—*2nd Class:* J. Riches.

WEST HARTLEPOOL.—*1st Class:* W. Mackey, W. Matthews. *2nd Class:* P. Crosby, C. Isaac.

LEITH.—*2nd Class:* G. Gunn, J. Lonie.

STEEL PAINTS.—Messrs. Arthur Ross, Hotchkiss & Co., Ltd., of 1, Glengall Road, Old Kent Road, London, S.E., advise us that they have purchased the business, plant, etc., of The Steel Paint Co., of 37, Gracechurch Street, London and Stockton-on-Tees, and that in future the business will be continued at Glengall Road. These steel paints have been used largely for over thirty years past, and are said to be most effective in protecting iron and steel structures from corrosion.

THE GAS-DRIVEN YACHT "Y DDRAIG GOCH."

IN shipping and yachting circles a great deal of interest is being taken in the four-masted fore and aft schooner *Y Ddraig Goch*, which has just been built on the Clyde by Messrs. Napier and Miller, Ltd., from designs by Messrs. Gray and Brace, the well-known naval architects, of London and Liverpool, for Mr. Godfrey Williams, of Aberpergwm. The vessel flies the burgee of the Royal Yacht Squadron and will be one of the three largest in that famous club's fleet. Only two excel her in point of size—the Duke of Bedford's *Sapphire* and the Marquess of Anglesey's *Semiramis*. Both of these are, however, steamers, while it is claimed that the *Y Ddraig Goch* has the distinction of being the largest motor auxiliary vessel in European waters—if not in the world. Her dimensions are as follows:—Length 200 ft., breadth 36 ft., depth 21 ft. 6 in., displacement 1,400 tons, gross measurement 1,000 tons.

She has been built to Lloyd's highest class for sailing ships, and considerably in excess of the requirements. The main deck is watertight for the greater part of its length, the space below being used largely for coal bunkers. These are watertight, so that when the fuel in them is burned they may carry water ballast. Provision for coal on a motor auxiliary vessel may at first sight seem odd; but the explanation is that the engine of *Y Ddraig Goch* runs on gas produced on board from anthracite coal. Although anthracite is now procurable at reasonable prices practically anywhere in the world the vessel can carry sufficient to take her round the world under power alone. Mr. Godfrey Williams, whose ship she is, owns rich anthracite coal fields in South Wales.

The auxiliary propelling machinery is situated aft in an engine room which is light and well-ventilated and admirably planned. There are two engines in it. One, a six-cylinder type of 160 brake horse power, drives a reversible feathering propeller through a clutch. If desired it may be disconnected from the propeller shaft and used to drive an auxiliary dynamo. The other engine is a four-cylinder unit driving a dynamo which provides the electricity for lighting the ship and driving the deck machinery. The generating set need only, however, be run during the day, as there is a secondary battery with a capacity equal to twelve hours' work of the whole of the ship's plant. The producers—which are, by the way, in duplicate—and scrubbers are on a higher level than the engine, all being above the waterline. The engines were made by Messrs. E. S. Hindley & Sons, Bourton, Dorset, and the producers by the Power Gas Company, Stockton-on-Tees. The motors are started by compressed air which is stored in wrought-iron cylinders.

Photo Messrs. Maclure & McDonald.

Y Ddraig Goch.

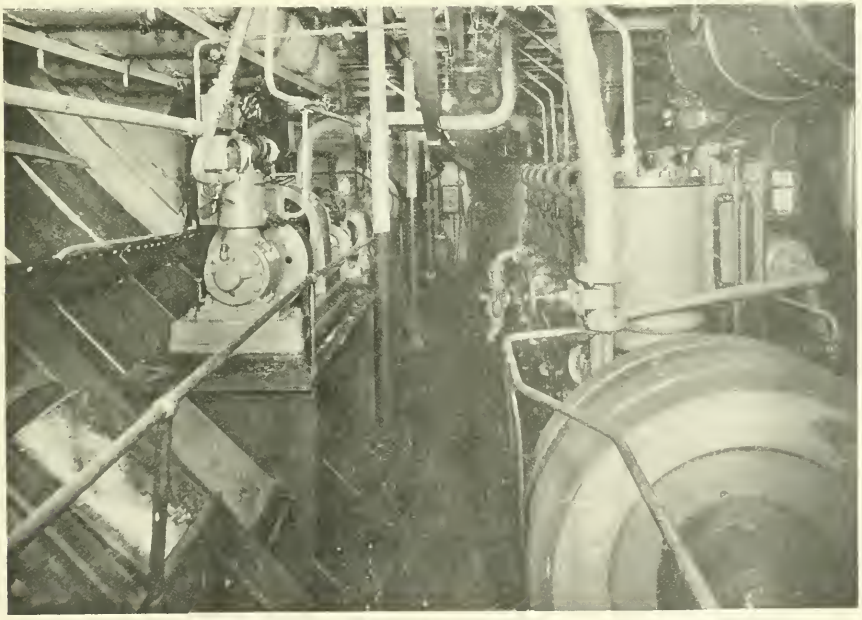


Photo Messrs. Maclure & McDonald.

Engine-Room looking forward, *Y Ddraig Goch.*

Phot. Messrs. Maclure & McDonald.

Y Ddraig Goch—The Dining Room

The crew and officers are berthed forward. The accommodation for the owner and his friends is situated amidships. In a deckhouse aft there is a daintily got-up writing room for the use of the ladies, a feature of it being some charming old-world furniture. In a deckhouse forward are a combined chart room and smoking room, and the entrance to the owner's principal rooms which are on the deck below. The dining room is a lofty, well-lighted apartment in white with panels on which are depicted ancient ships. Communicating with it, and also with Mrs. Williams's suite, is the drawing room, which is framed and furnished in walnut. Elsewhere the dressing rooms and state-rooms are in white, although in the children's cabins incidents of the chase in olden days have been delicately traced in blue upon the panels. The furniture, which is for the most part reproductions by Messrs. Gill & Reigate, London, of existing examples of the William and Mary period, is in walnut. The whole effect is extremely elegant.

The interior of the vessel is heated and ventilated by means of Thermotanks, which are in this instance adapted to the use of sea water in tropical climates. The temperature on board will never be more than two or three degrees higher than that of the sea water. Mr. A. W. Stewart, of Glasgow, who installed the Thermotanks, was also responsible for the electrical arrangements on the ship, which are excellent. Hot water is obtainable instantly in almost every part of the ship, a slow combustion boiler burning anthracite maintaining the supply. There is a Linde refrigerating plant for the preservation of provisions. Nothing, in fact, is lacking which is to be found on a modern ship of pleasure or of commerce. There is roller reefing gear on her booms. She spreads some 23,000 square feet of canvas, and is aloft and alow a thoroughly modern ship. *Y Ddraig Goch* is the owner's own idea of an ocean yacht, and reflects very high credit on his judgment.

NAVAL MATTERS—PAST AND PROSPECTIVE.

Portsmouth Dockyard.

THE event of the month has been the opening of our new lock, which took place without ceremony on April 7th. This important addition to the resources of the yard had been about four years in construction, and apart from the dredging which had to be carried out, over a million sterling has been absorbed by it. Considering the previous accommodation—or lack of accommodation—for ships of the largest classes, however, and the great advantage conferred by the completion of the new undertaking, it must be admitted that the money was well spent. Hitherto, No. 15 dock, the only one in Portsmouth dockyard capable of taking *Dreadnoughts* if the floating dock is excepted, could only be approached by way of Fountain Lake entrance on 14½ half-days in each month, night tides and Sundays included. As it is not the custom to dock ships at night or on Sundays, the number of half days per month was reduced to seven. Moreover, even on these comparatively few occasions, *Dreadnoughts* have had to be lightened considerably, and it has been officially admitted that in full cruising trim a ship of this class could only enter No. 15 dock on three days in the year. The opening of the new lock makes it possible for all ships to be passed through into the basins at any state of the tide, while the lock can also be used as a graving dock. It has a length of 850 ft., compared to the 612 ft. of No. 15 dock; a width at the entrance of 110 ft., and between the copings of 119 ft.; as compared with 94 ft.; and a depth of 46½ ft., over the sill at high water, as compared with 34 ft. Parallel with "C" lock, as it is called, a new dock of similar dimensions is being made, which Mr. Churchill promised the House of Commons would be in use early next year. The first vessel to go into the new lock was the battle cruiser *Princess Royal*, whose arrival here for docking instead of at Devonport, where she had always gone before, was noted last month. As regards other refitting work, the *Dreadnought* is still in hand, and the *Monarch* and *St. Vincent* have also come in, the latter after shifting her rear-admiral's flag to the *Colossus*, which will fly it temporarily. The ex-battleship *Hood* has arrived from Queenstown to be fitted for service as a target, and the scout cruisers *Pathfinder*, *Sentinel*, and *Skirmisher* have to be re armed as well as re-boilered, although only the first-named has yet been taken in hand. The *Australia*, battle cruiser, has got through her trials with complete success, and went back to the Clyde to complete fitting out before the end of March. There is little to report in regard to new construction, which appears to be going on at a satisfactory rate. The First Lord and other members of the Admiralty Board arrived in the port on board the *Enchantress* on April 5th, and remained for the week-end. Their visit, which was quite unofficial, occurred between the official inspections at Devonport and Chatham yards. Mr. Churchill came ashore on the Sunday, and also visited the battleship *King George V.* at Spithead. Possibly the First Lord took the opportunity to gather first-hand information about the unrest among the engineering workmen, which has made itself more prominently felt since our last report. On April 12th, the mechanics connected with the engineering trades followed the example of their confreres at Devonport and declared a strike against overtime, but the officials do not anticipate that the progress of work will be very much affected.

Devonport Dockyard.

In spite of the "overtime strike," there has not been a noticeable delay in getting away ships for the combined fleet exercises which usually take place in the spring, and more vessels of the larger classes have probably been completed for sea here during the month than in any other yard. Not only the ships in full commission belonging to the First Fleet, but those in what is now known as "active commission" have been engaged in exercises or gunnery practices, while even those in "reserve commission" have been, on the go in connection with the changes in their organisation caused by the transfer of a squadron to Pembroke. The changes in the designation of the status of commissioned ships which come into use on May 1st will make for simplicity and convenience, and after the cumbrous and sometimes confusing terms formerly used are to be welcomed. Ships which always carry full complements will be termed "in full commission," and such ships mainly form the First Fleet. Ships which have nucleus crews, but for which the full number of active service ratings are available in the schools and barracks when required, will be termed "in active commission," ships in this category forming the Second Fleet. Ships which have reduced crews, and the mobilisation of which involves the issue of a Royal Proclamation calling out the reserves, will be said to be "in reserve commission," and these vessels mostly belong to the Third Fleet. The official inspection of the Admiralty Board took place on April 3rd and 4th, when Mr. Churchill, Prince Louis of Battenberg, Sir John Jellicoe, Sir Francis Hopwood, and Sir Graham Greene were present. The officials accompanying these members of the Board included

Sir James Marshall, the Director of Dockyards. In the course of the tour of the dockyard, the battleship *Warspite*, light cruiser *Aurora*, and oil tank vessel *Carol*, were inspected, and the shore establishments visited included the ordnance depot at Bull Point, the detention barracks, the Royal Naval War College, the Royal Marine Barracks, and the Naval Hospital at Stonehouse. The harbour training schools came in for perhaps more extended notice, but the whole inspection was a thorough one, and passed off without any striking incident. On each evening a dinner party was given by the First Lord on board the Admiralty yacht *Enchantress* to the principal officers and officials of the port and dockyard, the guests also including Captain Makarlinsky, commanding the Russian gunboat *Khivinetz*, which paid us a visit from April 1st to 5th. This was the second Russian warship to visit here within a month, the cruiser *Oleg* spending a week in the port during March. The fleet exercises already mentioned have reduced the amount of refitting work in hand, enabling more attention to be given to new construction. The only armoured ship under refit at the time of writing is the cadets' cruiser *Cornwall* but we have also some torpedo craft making good defects. The *Centurion's* completion is being hastened, but it will not be before the middle of May that she will be commissioned. The *Orion* has been docked again during the past month to have re-rivetted some plating which was strained apparently by her collision with the *Revenge* as far back as January 7th, 1912. Her 4-in. guns which are near the muzzles of the 13 5-in. weapons have also been fitted with flash protecting plates.

Chatham Dockyard.

My Lords Commissioners of the Admiralty have made their annual inspection of the dockyard at Chatham since last month's report, and by all accounts must have been fully satisfied by what they saw. The members of the Naval Wing of the Royal Flying Corps joined in the welcome to the Board this year, making some fine flights in their machines over the yard and adjoining establishments. On the day of their arrival, April 7th, the Admiralty Lords were occupied with the new construction at present in hand. They spent some time in inspecting the *Lowestoft*, the latest of the "City" cruisers, which was being prepared for her launch on April 23rd by Lady

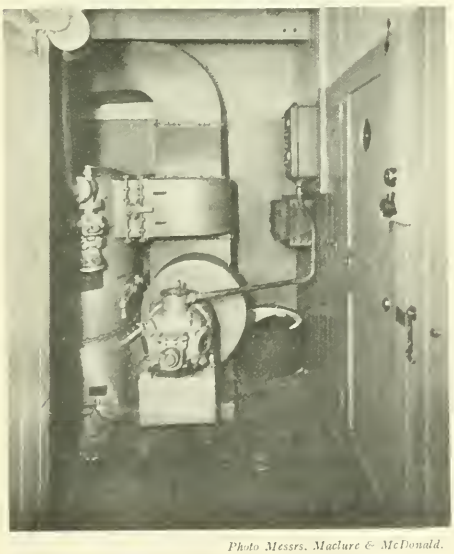


Photo Messrs. Maclure & McDonald.

Thermotank. *Y Ddraig Goch.*

Photo Messrs. Maclure & McDonald.

Y Ddraig Goch. Mrs. Williams' State-room.

Beauchamp, and which event passed off very successfully. The submarines which are being built also engaged the close attention of Mr. Churchill and his colleagues. On the second day of the inspection, the naval barracks and gunnery school, the marine barracks and naval hospital, and various other establishments were visited. There has been a reduction in the number of ships refitting, due to the departure of the *Formidable*, the *Natal*, the *Topaze*, and other ships, but there remain in dockyard hands the battleship *Queen* and light cruiser *Falmouth*, which arrived on March 28th and 27th respectively, the former after transferring the flag of Vice-Admiral Hamilton to the *Implacable*. The *Topaze*, which has had a long retubing refit, is not to return to her former duty as parent ship of the Sixth Destroyer Flotilla, but has been attached instead to the Sixth Battle Squadron now in process of formation from the gunnery training ships. Refitting work in progress includes also the thorough repair of the cruisers *Hogue* and *Diamond*. It is always pleasing to be able to report additions to our equipment, however small, hence the arrival at the end of March of a new large floating crane from the Victoria Docks may be mentioned. The crane has been bought by the Admiralty for use in connection with the floating dock, which although placed some distance down the Medway from Chatham yard is worked from here. Before long, however, it is expected that the floating dock will be taken to Cromarty. The destoyers *Cockatrice* and *Shark*, built by the Northern firms of Hawthorn Leslie and Swan Hunter, have been commissioned here during the month for the Fourth Destroyer Flotilla, and left to join that force before its week's manoeuvres with the First Fleet from April 14th to 19th. Doubtless the fact that the Fourth Flotilla now includes the original "ocean-going destroyers" of 1907-9 and the newest boats of the *Acasta* class had something to do with its selection to join in the exercises of the First Fleet under Sir George Callaghan, since the comparative capabilities of the new type for the defence and attack of a battle fleet could be tested.

Sheerness Dockyard.

At last the Naval Wing of the Royal Flying Corps is to have a sea-going tender of its own, and the cruiser *Hermes*, built by the Fairfield Company in 1898, has been selected for the purpose. Since its establishment last year, the Naval Wing has had its headquarters in the *Actaeon*, the torpedo schoolship at this port, and all officers and men appointed for service in the Corps have been borne on the books of that vessel. In future, they will be borne in the *Hermes*, which recently returned home from service on the Cape Station. The *Hermes* was paid off at Portsmouth on April 15th, and brought here next day by a navigating crew. Presumably, Commander Samson, commanding the Naval Wing (Aeroplane Section), will be placed in command of the *Hermes*, as soon as she is ready for her new duties. Meantime, the Admiralty are proceeding steadily with the development of a chain of air stations

round the [illegible] of the United Kingdom, and so the Nore dockyards will lose their monopoly of these latest adjuncts to the Navy. The establishment of the first independent air station on the Island of Grain in January has now been followed by the "commissioning" of other stations at Calshot, on Southampton Water, at Harwich, and at Great Yarmouth, each of which has been supplied with officers and men from the Eastchurch Flying School. This distribution of qualified pilots among the new stations does not mean, however, that the Eastchurch School will lose any of its present importance; indeed, it must undertake training work on a larger scale than ever before to supply growing needs. In the new Navy Estimates, provision is made for the expenditure of £6,600 during the present year on accommodation for hydro-aeroplanes at this yard. The conclusion of Easter leave and the assembling of the First and Second Fleets and of the destroyer flotillas for spring exercises depleted the total of ships in harbour, but as regards the dockyard there is no lack of work. The torpedo craft in dockyard hands have been added to by the collisions between torpedo boats 114 and 18, and torpedo boats 5 and 34. The first-named was rather a startling affair, occurring on the night of April 1st, while the torpedo boats of the Nore Flotilla were exercising in the Thames Estuary, and while No. 114, the senior officer's boat, sustained a large rent on her starboard side, No. 18 also had her bows crushed. Only prompt precautionary measures and the proximity to Sheerness yard prevented No. 114 from foundering. She was taken at once into No. 2 dock, and within a few hours had been surveyed, estimates for repair submitted, and workmen were actually employed in making the boat seaworthy again.

Pembroke Dockyard.

The launch of the *Nottingham* on Friday, April 18th, was a great success. The honour of performing the naming ceremony was entrusted to Miss Violet Asquith, the Prime Minister's daughter, and in addition to a large and distinguished gathering of local officers and officials, the Mayor and Town Clerk of Nottingham attended the function as an evidence of the interest evinced in the ship by the city after which she is named. Miss Asquith has now followed the example of Mrs. Asquith, who named and launched the battleship *Collingwood* in 1908. After the *Nottingham* had been successfully launched, the mallet and chisel used, as well as a water-colour picture of the *Nottingham* as she will appear when completed, were presented to Miss Asquith in a carved oak box on which was engraved the Asquith coat of arms. In the previous week, we had a visit from Dr. Macnamara, the Parliamentary Secretary to the Admiralty, for the purpose of meeting deputations of the workmen in regard to their conditions of labour, hours, and pay, etc. There were no fewer than 39 deputations seen by Dr. Macnamara, and if it were too much to hope that even a fraction of them could be satisfied as a result of the reception of their statements of grievances, at least they could agree that their claims were listened to with patience and courtesy. Time alone will show what the outcome of these annual petitions for 1913 will be. As a rule, the authorities represent themselves as willing to do more in the way of increased pay and the like if they could obtain Treasury sanction, and as Dr. Macnamara said during the Navy Estimates debates, in the last six years dockyard wages had increased by a sum of £140,000 annually. Not all of this sum, it is to be presumed, has been devoted to higher rates, however, and if only as an acknowledgment of the increased efficiency of the yards to which Mr. Churchill made reference recently, some concessions in the present year would be welcomed. In addition to constructional work in progress, the destroyers *Ness* and *Swale* are being refitted. The destroyer *Nith* completed her retubing refit in the second week of the month, and left on the 15th for Chatham. The only other event of importance has been the commissioning of the light cruiser *Amphion*, which took place at Devonport on April 2nd, the vessel having left here a week previously for the purpose. With the departure of the *Amphion*, the *Fearless* remains the only cruiser of the *Boadicea* type in hand here, and as she was launched last June it should not be long before she is ready to follow the *Amphion* into commission.

MEMORIAL TO JOHN ROBERTSON.

Maker of the Steamboat "Comet's" Engine.

THE *Comet* Centenary Exhibition, which was held last year in the Kelvingrove Galleries, Glasgow, and the celebration on the Clyde of the launch of the pioneer steamboat one hundred years ago, fittingly recalled attention to the men who were engaged jointly in the construction of the historic little vessel, *viz.*, Henry Bell, John Wood, John Robertson and David Napier. These men have been commemorated in various ways permanently—monuments, life histories, etc.—but of John Robertson, who made the *Comet's* engines there was practically nothing in existence—except indeed the actual engine, with the photo of Robertson alongside, housed in the South Kensington Museum—until August last year, when a monument of obelisk form, with suitable inscription, erected by public subscription was unveiled at his native village of Neilston, Renfrewshire.

While the place of Robertson's nativity has been, in this way, fittingly signalized, it was not until a few weeks ago that anything existed to mark the place of his burial in the Southern Necropolis, Glasgow. On April 22nd a memorial stone—of which we are enabled herewith to present an illustration, and which has been erected at Robertson's grave through the subscriptions mainly of members of the Institution of Engineers and Shipbuilders in Scotland—was unveiled by Mr. James Gilchrist, of Messrs. Barclay, Curle and Co., a past president of the Institution. Among others present at the unveiling were Mr. George Russell, of Messrs. Russell & Co., crane makers, Motherwell, also a past president; Mr. David Bell, Mr. David D. Napier (grandson of David Napier), Mr. Edward H. Parker, secretary of the Institution of Engineers and Shipbuilders, and Mr. Kellock Brown,

Kellock Brown, Sculp.

Illustration of the Bronze Tablet which is set in a rough cut granite monument erected in the Southern Necropolis, Glasgow.

sculptor, from whose designs the memorial stone has been executed.

Mr. David Bell, one of the promoters of the movement to erect the memorial, read a statement regarding Robertson's life and work. Robertson, he said, commenced business for himself about 1810 in a small engineering or machine shop in Dempster Street, off North Frederick Street, Glasgow. In 1811 he commenced to make a small side-lever condensing engine—for what purpose was not recorded; but that little and somewhat rude engine was destined to become famous in the annals of engineering, because, just then, Henry Bell arranged with Robertson to supply and fit the engine he had in hand, into the *Comet*. John Robertson's interest was awakened to the possibilities that might follow this new application of steam power, and from this point he gave his attention chiefly to the construction of machinery for steamboats and to the utilization of his opportunities as a steamboat owner. In 1813, the year immediately following the launch of the *Comet*, he with a partner had the steamboat *Clyde* built for passenger service between Glasgow, Greenock and Gourock. This vessel, which was nearly twice the length of the *Comet*, was said to have been "very successful." In the following year another steamer was built for him at Dundee, and she plied for four years between Perth and Dundee, being brought thereafter to the Clyde. Subsequently he owned two other steamboats, which were employed for a time on the East Coast of England, so that Robertson appears to have been the first to send steam vessels from Scotland to England. Other vessels were built for Robertson in 1816 and 1818, which plied for a time on the Clyde, but the competition of steamboats had already become keen on the river, and it would appear that losses rather than gains resulted in Robertson's case. It might be added that Robertson was said to have invented what was known as the locomotive or slide valve, and in view of all that he actually carried out and attempted he was undoubtedly to be regarded as one of those ingenious and enterprising pioneer workers who did very much in his day for the promotion of engineering and steam navigation in our country. He died at Carrick Street, Glasgow, in November, 1868, aged 86.

The monument is of rough cut granite stone, with a bronze tablet in front, bearing the following inscription:—"Erected in 1912 by members of the Institution of Engineers and Shipbuilders in Scotland to the memory of John Robertson, engineer, born 10th December, 1782, died 19th November, 1868, maker of the engine of the *Comet*, 1812, the first steamboat that plied regularly in Europe."

MR. WILLIAM IRELAND.

MR. WILLIAM IRELAND, who for the long period of forty-four years has been in the service of the Anchor Line of steamships—for the past twenty-four years in the capacity of assistant superintendent engineer—is now retiring from active work, and to mark the occasion and the respect in which he is held by his colleagues, he was presented with a silver rose bowl and a purse of sovereigns at a meeting held within the engineers' office, Yorkhill, on 3rd April, and attended by a few of his many friends and colleagues who had spontaneously subscribed for the testimonial. The presentation was made by Mr. Bruce, of the superintendent engineer's department, and the gathering was presided over by Mr. W. L. C. Paterson, chief superintendent. Mr. Ireland, whose portrait we are here enabled to give, joined the Anchor Line service in January, 1869, the first vessel in which he sailed being the s.s. *Spartan*, 296 tons register. In the capacity of second engineer he was with this vessel till March, 1871, and in May, 1871, he joined, also as second engineer, the s.s. *Britannia*, a western ocean boat. While still serving on board this vessel he was promoted in November, 1872, to the post of chief engineer. The *Britannia* was wrecked, homeward bound, at south end of Arran on 27th January, 1873, and Mr. Ireland in March, 1874, joined the s.s. *Castalia* as chief engineer. Here he remained till November, 1879, and in March of the year following he joined the s.s. *Elysia* in London, during the London and New York service. He was then transferred to s.s. *Circassia* in September, 1881, and again to s.s. *Furnessia* in March, 1883. He served on board this—the then crack ship of the Anchor fleet—till

Yours Sincerely
Wm Ireland

January, 1889, when he was called ashore to fill the post of assistant superintendent engineer, which he has ever since worthily occupied. He retires from active service, it should be added, with the good wishes of the directors and a generous annuity.

At the presentation function on the 3rd April the friends present included Messrs. Paterson and Bruce, superintendent engineers, Mr. James Kinloch, N.A., Bailie Harley, Messrs. Denholm, Colquhoun and Grass, chief engineers in port, etc. In the absence of Commander R. C. M'Fee, R.N.R., general superintendent, Mr. Paterson, as has been stated, presided. Mr. Ireland, in responding to the remarks of Messrs. Bruce and Colquhoun, who made the presentation, said he looked back with great pleasure to the happy associations with and good fellowship of his fellow-workers in the Anchor Line, and thanked them for the unique testimonial, which he valued very much as the expression of the goodwill of his friends. Bailie Harley made a few happy and felicitous remarks about his long and pleasant associations with Mr. Ireland, extending for a period of over fifty years. Mr. Kinloch expressed the pleasure he had in being present and in his association with Mr. Ireland, and hoped he and Mrs. Ireland would have many years of health and happiness in their retirement at Aberdour, Fife.

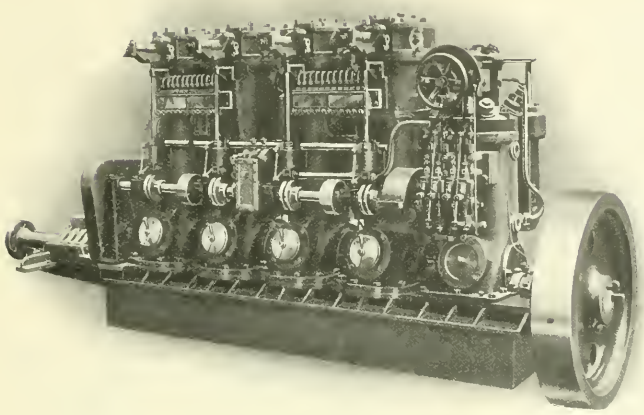
MR. PETER WHYTE, M.INST.C.E.

MR. PETER WHYTE, M.Inst.C.E., who has acted as superintendent and engineer of Leith Harbour and Docks for the past thirty years, intimated, on March 31st last, his resignation to a special meeting of Leith Dock Commission. The commissioners accepted his resignation, but resolved to retain his services as consultant manager and adviser and further to appoint as superintendent Mr. Alfred H. Roberts, M.Inst.C.E., the present assistant engineer at the docks. Born about sixty-five years ago at Invermay, near Perth, Mr. Whyte received his education at Perth Academy, afterwards being apprenticed to a firm of surveyors in the "fair city," and in this employment he acquired the elements of his adopted profession. Thereafter he was for two years an assistant to Mr. Hugh H. Maclure, a leading civil engineer, in Glasgow, and during that period he gained valuable experience. On the initiation of the Bute Docks scheme at Cardiff Mr. Whyte in 1866 was appointed to a position as engineer, and was actively engaged on work connected with the construction and equipment of wet and graving docks. In 1875 he was appointed chief assistant to the general manager of the docks, and in addition to being acting engineer he had extensive experience in all matters concerned with the management of docks. During the next eight years Mr. Whyte ably filled the position and throughout his stay at the Welsh capital the prosperity of Cardiff was such that the work of the docks was practically trebled. In 1883 he was elected to the combined office of superintendent of harbour and docks and acting engineer to the Dock Commission of Leith, and during the long period of about thirty years he has filled the position the history of the Leith Docks has been an unbroken record of prosperity and development.

MARINE MOTOR NOTES.

WHEN visiting Continental ports it is interesting to contrast with British ports the measures which are adopted for the transportation of merchandise and goods to and from inland manufacturing centres by means of canals and water ways, or coastal places where facilities do not exist for the loading of ocean-going steamers, mainly because the export and import trade is insufficient to justify a large harbour expenditure. The size and carrying capacity of the barges afford a very striking comparison, the Continental type being large carriers, and capable of moving several hundred tons, and in some cases nearly one thousand tons, with accommodation for master, mates, and their families, the living quarters bearing the marks of taste and decoration. The British canal barge is much smaller and lighter, due to the difference in the inland waterways, —with a few exceptions. The immense advantage gained by the introduction of motors into such craft has been recognised more fully on the Continent, and it is somewhat surprising that the British barge owners have not entered with greater energy and enterprise into an obviously economical advance over passing procedure. There is evidence that slowly and gradually the oil motor is making its advantages known for the propulsion of coastal vessels and barges, whether as an auxiliary to make use of along with or in place of sails, according to weather conditions, or as a sole prime mover. The large sailing vessels equipped with this auxiliary have done well from an economical point of view, as well as from that of ease in handling. Among other firms who have supplied motors to coasting vessels Messrs. Beardmore have fitted the following: Pilot ketch *Nab*, 80 B.H.P., speed 7½ knots; four coasting vessels for the West of Scotland (Coasting Motor Shipping Company), one with 80 B.H.P., speed 8 knots, and three with 130 B.H.P., speed 8 knots; while other four are building for the same Company, to be fitted with motors of 240 B.H.P. An auxiliary coaster for Messrs. Willoughby Bros., 45 B.H.P., speed 6 knots, and a barge for Messrs. Crouchers, Limited, fitted with 60 B.H.P. In larger vessels two sets of motors may with advantage be fitted. The type of motor manufactured by Messrs. Beardmore is the semi-Diesel and the fuel used is crude oil. The illustrations show one of the coasting vessels engined by Messrs. Beardmore, and the four-cylinder type of engine fitted. The launch of the *Innishannon*, by Messrs. Chalmers at Rutherglen, Glasgow, placed in the water one of the larger vessels of The Scottish Motor Shipping Company's growing fleet. This vessel is being fitted with a Beardmore engine of 250 h.p. The *Innisfree*, also launched in April, is a smaller vessel built by Messrs. McGregor, Kirkintilloch. Vessels of this class are increasing for coastal service, while those of the barge type are not so frequently seen; there are a few on the way, but the Thames, with its water ways, where there is ample scope for motor barges, has not arisen to the occasion, —is yet awakening. The racing craft at Monaco this year form an interesting collection and British owners and builders have made a good show, according to the reports published from time to time of the events and the results. The *Isleford*, fitted with Bolinders motor, has not been left long in the hands of the owners for whom she was built, having been purchased by the Admiralty. The additions thus being made, including the orders now on hand by contractors for Government service, of motors of large size, indicate the official view on the subject of oil and it should also be indicated what action is contemplated regarding engineers qualified to take charge of internal combustion engines and a Royal Naval Reserve to serve as a stand-by. The unhappy accident which resulted in injury to several men on board

Motor Coaster, 270 tons D.W. carrying capacity. 99′ 8″ O.A. × 18′ 9″ b
× 9′ 6″ depth mld; speed 8 knots. Fitted with 130 B.H.P. direct revers
"Beardmore" Semi-Diesel Oil Engine, by Messrs. Wm. Beardmore &
Ltd., Dalmuir, Scotland.



130 B.H.P. "Beardmore" reversible Semi-Diesel oil engine, 340 R.P.M.

the *Rubicon*, on returning to Messrs. Camper & Nicholson's yard, after a successful trial of the machinery, emphasises the necessity of exercising great care and attention in the stowage and handling of oils giving off explosive vapour. Taking into consideration the large number of vessels fitted with oil motors the percentage of accidents is comparatively small, but there are cases where accidents of a minor character occur and do not reach the report stage. It is therefore wise to impress upon those in charge to post up regulations on the subject for the guidance of all concerned. The explosions on two French submarines recently and on an airship resulting in the death of the aviator add to the emphasis, as well from the designer's as from the chargeman's point of view. The disturbed state of Mexico keeps back the development of the country and those who have investments in industrial undertakings in that region have been looking anxiously for signs of a more settled condition of affairs. The oil production of Mexico is a much smaller percentage of the total than one would expect and it may be that with a more settled community and the realization of higher instincts among the more turbulent, both the oil production and other commercial interests would respond.

THE ELECTRIC SHIP "TYNEMOUNT."

A LAUNCH of considerable interest took place on the 26th of March from the yard of Smith's Dock Co., Ltd., Middlesbrough. This was the launch of the electric ship *Tynemount*, which has been built by them as a subcontract from Messrs. Swan, Hunter & Wigham Richardson, Ltd. The *Tynemount* is a steel vessel of 250 ft. in length, 42 ft. 6 in. breadth, 19 ft. in depth and carries on a mean draught of 14 ft. a total deadweight of 2,400 tons. The oil engines generating the electricity are two in number, each of 300 b.h.p., of the standard type developed by Messrs. Mirrlees, Bickerton and Day, of Stockport, and the electric installation throughout is by Messrs. Mavor & Coulson, of Glasgow. The order for the vessel, which is to ply on the Canadian Lakes, was placed by the Montreal Transportation Co. through Messrs. John Reed & Co., of Glasgow and Montreal. We shall give more detailed particulars when the trials of the *Tynemount* have been run, as the determination of the possibilities of electricity in marine work must be of great interest to our readers.

At the quarterly Court of Governors of the Marine Society held on the 21st April, Admiral Sir Lewis A. Beaumont was elected Chairman of the Committee.

The British "Niclausse" Boiler Co., Ltd., of Caxton House, Westminster, advise that they have been successful in securing in open competition the contract of the Southend Corporation for two 25,000 lbs. capacity boilers, complete with "Niclausse" stokers, superheaters and forced draught fan equipment and Green's economisers, etc.

We learn from a Board of Trade circular that a subcommittee of the International Conference for the Unification of Maritime Law met at Brussels on 26th March and the following days to give further consideration to draft conventions relating to the limitation of shipowners' liability and to maritime mortgages and liens. The full conference will reassemble in the autumn.

MR. T. C. TOBIN.

MR. TOBIN, who until recently was head of the Ship Designing Department at Messrs. Cammell, Laird & Co., took up his new duties at Belfast, with Messrs. Harland & Wolff, Ltd., at the beginning of April.

An interesting and valuable paper on the "Weight Factor in Merchant Ship Design," was read by Mr. Tobin before the Liverpool Engineering Society, on February 19th. Mr. Tobin has received an important position on the Technical Staff at Queen's Island.

OBITUARY.

Mr. Gustav Wilhelm Wolff.

THE death of Mr. Gustav Wilhelm Wolff, at the age of seventy nine, removes the last of the founders of the great shipbuilding business of Harland & Wolff, the firm which has done so much not only for the development of Belfast, but also for the making of the modern passenger steamship. Mr. Wolff was born at Hamburg in the year 1834, being the son of a local merchant. But at the age of fourteen he was sent to England to pursue his studies at the Liverpool College, and thenceforth he was identified with the country of his adoption. Leaving school he was apprenticed to the well-known firm of Joseph Whitworth and Co., engineers and especially makers of machinery and tools. When but twenty years of age he was sent to take charge of a stall at an Exhibition in Paris. Then, after holding one or two minor appointments he commenced his long connection with Belfast, accepting a post as draughtsman in a Belfast shipbuilding yard – that of Messrs. Hickson's, then a very small and almost unknown affair, employing not

The late Gustav Wilhelm Wolff.

more than 200 hands. In the year 1860, however, the Queen's Island yard changed hands and commenced its phenomenal development, being acquired by Mr. Harland, who placed Mr. Wolff in the position of manager, and in 1862 admitted him into partnership. Soon the firm began to be widely known on account of the success of the long steamships which they were turning out for the old Bibby line, and for its successor the Leyland Line. It was from the model of the e ships that the original design of the old *Oceanic* was evolved, and when the first *Oceanic* made her successful début in 1870 the fortune of the great firm of Harland & Wolff was assured. We need not dwell on the immense amount of tonnage of the highest class which the firm has turned out for the White Star Line. All that is known. Amongst their regular customers have been the new Bibby Line, which has never had a ship built elsewhere, the Peninsular and Oriental Co. has gone to them for several mail steamers, including two of the "M" class, and the old Union Company took all the famous "G.'s" as well as a number of twin-screw mail steamers, such as the *Briton*, *Norman* and *Saxon* from the yard. In point of fact this building for the Union line induced a connection which brought Mr. Wolff into intimate relations with that Company, and since its amalgamation with the Castle line the orders for new mail steamers have been equally divided between Queen's Island and the Fairfield Company. The Royal Mail, the Pacific Steam Navigation Company, and many others too numerous to mention became regular customers and the success of the business was assured. But many years ago Mr. Wolff became connected with London finance and went into Parliament – being one of the representatives of Belfast from 1892 to 1910 – and was returned five times unopposed for the town for which he has done so much, and so he took less and less interest in the details of the business which at that time were taken over by Mr., now Lord Pirrie. Thus it is that the later developments of Messrs. Harland & Wolff were outside Mr. Wolff's occupations, and he finally severed his connection with the firm in 1908. Though of late years he was little in the Irish city, he will be greatly missed there on account of his numerous benefactions to public objects. It may be mentioned that Mr. Wolff was never married.

Mr. Daniel Ferguson.

We put on record, with regret, the death of Mr. Daniel Ferguson, a member of the firm of Messrs. Ferguson Brothers, Ltd., shipbuilders and engineers, Newark Works, Port Glasgow, which took place at his residence on April 10th. Deceased, who was only thirty-two years of age, had been at business, in usual health, only some four or five days preceding his demise, which was brought about by a sharp attack of pneumonia. He was born in Paisley and was educated in the old Grammar School in that town. His father, Mr. Peter Ferguson, was long one of the principals in the shipbuilding and engineering firm of Messrs. Fleming and Ferguson, and he was, with his three brothers, trained in the business of shipbuilding and engineering; dredger building being a strong speciality. About ten years ago Mr. Ferguson, senior, seceded from the Paisley concern and, with his sons, started operations in Newark Yard, Port Glasgow, dredgers, barges and steam tugs chiefly forming the work carried on. Recently the firm was made a private limited company. Mr. Ferguson was highly popular in business and other circles and leaves a widow and four young daughters.

Prof. A. C. Elliott.

We have received with very great regret intimation of the death of Professor A. C. Elliott, D.Sc.(Edinburgh University). This took place on April 21st, at Porthcawl, Glamorgan, his favourite recuperating place, where he was resting at the time. Prof. Elliott had been resident for many years at Cardiff as Professor of Engineering at the South Wales University College. Our associations with him at intervals during the past twenty-three years have been of a pleasant character and have left sweet memories of himself and Mrs. Elliott, to whom we extend deep sympathy in the severe trial which she has been called upon to undergo. Born at Glasgow about the year 1861, A. C. Elliott was educated at Glasgow and Edinburgh, attending the Universities of both cities, and obtaining the degree of D.Sc. at that of Edinburgh. While at Glasgow he was student under Sir Wm. Thomson, and gave promise then of high attainments, obtaining distinction in the examinations. He entered upon practical work in the engineering department of the Glasgow and South-Western Railway, and was afterwards assistant to the engineer-in-chief. A few years later he was associated with Sir Wm. Thomson and Prof. Fleming Jenkin as assistant in connection with their consulting works. Previous to being appointed to the chair of engineering at Cardiff, he was assistant Professor of Engineering at Edinburgh University. He was a member of the Institution of Civil Engineers, President of the South Wales Institute of Engineers, and a Vice-president of the Institute of Marine Engineers. He was elected a member of the Institute of Marine Engineers in 1890, a few months after his appointment to the University College, Cardiff, where his association with marine engineers led him to take a warm interest in the proceedings from an educational point of view. He also contributed to the Transactions and otherwise devoted himself to advancing the aims of the promoters of the Institute,

The late Prof A. C. Elliott.

and when Lord Kelvin (Sir William Thomson) was elected President, his former pupil, Prof. Elliott was President of the Bristol Channel centre of the Institute, and, at the annual dinner, responded on behalf of "the country members."

We regret to announce the unexpected death of Mr. Keddey Ray Fletcher, D.C.L., the chairman of Messrs. Fletcher, Son & Fearnall, Ltd., of Union Docks, Limehouse and Tilbury. Mr. Fletcher returned from the United States on March 22nd and was taken ill on arrival at his home at Abbott's Ann and died on March 29th. Mr. Fletcher had been Master of the Draper's Company, and was a member of the governing body of the University of London and of the East London College.

SHIPPING, ENGINEERING AND MACHINERY EXHIBITION.

PREPARATIONS are now being made to hold an exhibition at Olympia from September 25th to October 17th, 1914. The organizing managers are Messrs. C. H. Luke and Fred W. Bridges, whose experience in connection with former exhibitions gives promise of a successful issue to their new venture. In the preliminary notice it is stated that the classes under which the exhibits will be grouped are as follows:—(1) Naval Engineering. (2) Shipping, including all fittings and details in connection with seagoing vessels. (3) Fishery, including the various features of the fishing industry. (4) General marine, including lighthouses, harbours, etc. (5) General engineering, including types of machinery used in building and repairing. The proposed scope of the exhibition as outlined should result in a most interesting group of all that is worth seeing and studying in connection with the sea and those who float upon its waters, whether from duty, pleasure or profit. It may be mentioned as a feature of special interest to intending exhibitors or as an incentive to those contemplating the advisability of being represented at the exhibition, that it is being arranged and is to be conducted on co-operative principles, so that the success of the whole will be shared by each exhibitor. Spaces, we have been informed, are already being booked.

Industrial and Trade Notes.

THE CLYDE AND SCOTLAND.

(*From our own Correspondent.*)

Notable Productions.—Probably at no other period in the history of the Clyde shipbuilding industry has there been such notable and simultaneous output of high-class tonnage as has characterised the past eight weeks' doings concerned with launching, completing, trying for speed, and handing over steamships to their owners. Leaving out of account meantime the most recent launches, and vessels in the later stages of fitting out, there have been within the period stated as many as eight vessels, ranging in tonnage from 8,000 to 15,000 tons and representing in the aggregate no less than 75,000 tons, put through their various trials and despatched to the various parts of the world where they are destined to engage in regular service.

The "Aquitania" and "Calgarian."—Two of the recent launches taking place within two days of each other, and from shipyards not very widely apart, afford a fitting crown to this record of achievement. For adequate descriptive details of the consigning of the giant 47,000-ton Cunard liner *Aquitania* from the stocks of Messrs. John Brown & Co., Clydebank, on April 21st, and of the 18,000-ton Allan liner *Calgarian* from the Fairfield stocks on April 19th, it is necessary that we should refer the reader to other pages of this issue. Both events were successfully carried through and in the presence of vast crowds of spectators, which in the case of the Cunard liner were simply stupendous.

The "Gelria."—The most notable production next to be sent off from a Clyde shipyard is the twin-screw steamship *Gelria*, which Messrs. Alex Stephen & Sons, Linthouse, will launch on May 7th, to the order of the Koninklyke Hollandsche Lloyd, of Amsterdam. She is the first of two sister vessels—the second ship, *Tubantua*, being also on the stocks at Linthouse—designed for mail and passenger service between Holland and South America, and splendidly equipped for a large number of passengers. The two vessels in that respect are even more notable than the sister ships *Hollandia* and *Zeelandia*, built at Linthouse for the same owners and service about three years ago. Their length between perpendiculars is 540 ft., breadth moulded 65 ft. 6 in., depth moulded 39 ft., and gross tonnage about 14,200 tons. They will be fitted by the builders with quadruple-expansion reciprocating engines of about 11,000 i.h.p., designed to give the vessels a speed at sea of 17 knots. They will each carry as many as thirty-six lifeboats, ranged alongside for the greater part of the vessels' length. In construction and equipment the most skilful attention has been given to considerations of safety at sea.

New Contracts.—In regard to new contracts neither shipbuilders nor engineers on the Clyde have been favoured much in this way since the date of preparing last month's notes. The outlook in many ways is very uncertain and neither builders nor owners are encouraged to make strong bids for fresh tonnage, especially when running contracts are still on the whole plentiful. Wages demands on the part of the workmen, and complaints as to loss of time on that of the employers are rife, and by the time these notes meet the eye something decisive will have been reached as regards the sought-for advance in wages. The fact that recently the contract for three passenger and cargo steamers, each of 10,000 tons, for British owners, has been captured by a firm of French shipbuilders—the management of which, however, is almost entirely in British hands, several of whom were trained on the Clyde—has occasioned a good deal of comment in Clyde industrial circles. The loss of the order to British trade, although in a measure due to the French bounty on shipbuilding, is also largely due to the higher costs prevailing here and to the unsteadiness and delay on the part of the workmen; a subject on which Mr. Hill, the general secretary of the Boilermakers' Society, lectures the workmen very frankly in his latest circular to the members of the Society.

Messrs. Alexander Stephen & Sons, Ltd., Linthouse, have applied to the Clyde Trust for general approval of a fitting-out basin they intend constructing on the lands of Holmfauldhead, to the east of their yard, and of the road forming the approach

to Whiteinch Ferry. The Law and Parliamentary Bills Committee, while recognising that the Trustees are in principle favourable to the formation of private fitting out basins in connection with shipyards, have not seen their way to recommend the Trustees to express any detailed opinion on the proposed scheme until the firm had matured their plans and submitted them for approval, and it was seen how the interests of the Trust might be affected.

Messrs. William Denny & Brothers, Dumbarton, have added still another to the large number of notable channel passenger steamers which have emanated from their stocks. On April 12th they sent off the ways the twin-screw turbine steamer *Plover* (described in our "Launch" columns).

H.M.S. "Ajax."—From the basin of her builders, Scott's Shipbuilding and Engineering Company, Greenock, this new British 'super Dreadnought' was on April 19th taken to the Tail of the Bank in order to coal and get ready for proceeding to the South of England. She was to leave the Clyde on April 24th and after carrying out speed and other tests in the South return to the Clyde after several weeks for final completion.

Messrs. Barr & Stroud, whose finely equipped works at Anniesland, Glasgow, continue to be taxed for the production of range finders and other delicate scientific instruments used for naval purposes, have transferred their business to a private limited company having the title of Barr & Stroud, Ltd. The first directors are:—Archibald Barr, D.Sc., M.Inst.C.E.; William Stroud, D.Sc., M.A.; Harold Drinkwater Jackson, M.I.Mech.E.; James Weir French, B.Sc.; Neil John Mackay, B.Sc.

Messrs. Kelso & Co., of 1008, Pollokshaws Road, Glasgow, whose productions in the way of full and elaborately equipped ship-models are so frequently seen at exhibitions, have had their resources taxed of late to supply highly-finished models for various continental and home firms for showing at the forthcoming exhibitions at Ghent and Amsterdam. Messrs. Wilton's Engineering and Dry Dock Company, of Rotterdam, Messrs. Smulders, of Schiedam, and the Lytham Shipbuilding Company, Lytham, are amongst the firms recently supplied with interesting models of dredgers, barges, etc. More noteworthy still in the work partly completed and on hand are models in duplicate of the Royal Holland Lloyd's new steamships *Gloria* and *Tubantua* referred to above as about to be launched from the stocks of Messrs. Alex Stephen and Sons, Linthouse, Govan. The models are to a scale of ½-inch per foot and are splendid examples of the model-maker's art, the case containing each model being over 12 ft. in length by about 4 ft. in height above the stand.

Messrs. Yarrow & Co., Scotstoun, it appears from a statement recently issued, have had their patent water tube boilers fitted into 72·1 per cent. of the British battleships and cruisers built since 1905. The figures in regard to ocean-going torpedo-boat destroyers launched and building since 1907 show that 85·3 per cent. are fitted with the Clyde Company's boilers.

Messrs. Murdoch & Murray, Port Glasgow, who have just handed over a further twin-screw steamer, the *Poonbar*, to the agents of the North Coast S. N. Company, of Sydney, have received from the British Admiralty Commissioners an order to construct a single-screw steamer for service in the South of England.

Messrs. Ramage & Ferguson, Leith, have received an order to build a cargo vessel of about 260 ft. long, and considerably over 2,000 tons carrying capacity, for Messrs. Donald Currie & Co., Liverpool. Early in April the firm launched a steamer, 210 ft. in length, 31 ft. in breadth, and 16 ft. 2 in. in moulded depth, which they have built for the Leith and Orkney service of the North of Scotland and Orkney and Shetland Steam Navigation Company. The vessel has fine accommodation for a large number of passengers, and she will carry about 350 tons of cargo.

Leith Dock Commission have authorised an expenditure of £11,200 for the widening of the south quay of the Victoria Dock, for the new hydraulic engine, and for two movable hydraulic cranes for the south side of the Imperial Dock.

The proposed graving dock for Inverkeithing has been under further consideration by the Town Council, and decisions have been arrived at by the Harbour and Works Committee to the effect that in order to encourage the new industry no charge would be made on vessels using the graving dock for the purpose of undergoing repair or in respect of materials used in the repair of vessels. Any other vessels, however, would have to pay anchorage and shore dues.

THE TEES AND HARTLEPOOLS.

(*From our own Correspondent.*)

West Hartlepool.

Messrs. Herskind & Co. have sold the s.s. *Valhalla*, 2,628 gross tons, to foreigners through Messrs. Jupp, Hutch & Co., Ltd., and Messrs. T. Pinkney & Sons, Sunderland, for about £10,000; she has a deadweight of about 3,750 tons.

The s.s. *Dencholme*, 3,313 gross tons, which was burnt and sunk, has been reloated and sold by the Pyman S.S. Co. (G. Pyman & Sons, managers) to the Merritt & Chapman Wrecking Co., New York.

Messrs. W. Gray & Co. are very full up with orders for new work at both the old and new yards, which will keep them busy well into next year. Their dry docks are kept constantly employed with repair and overhaul work.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Ltd., Harbour Dockyard, are quite full up with work. They have just completed a very fine steamer, the s.s. *Digby*, for the Furness Canadian fruit trade.

The Central Marine Engine Works of Messrs. W. Gray and Co., Ltd., are very busy in every department, having to supply the engines and boilers for all the steamers building at their new and old shipyards. They have been very considerably inconvenienced by the bad delivery of material, but nevertheless have had a very good financial year.

Hartlepool.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Ltd., Middleton Yard, are kept very busy with the very large Dutch steamers they have on hand. They are reported to have secured a contract for a large twin-screw steamer, but the rumour lacks confirmation, though not unlikely a repeat order.

Messrs. Richardsons, Westgarth & Co., Ltd., continue as busy as ever, having a large amount of work on hand. They are reported to have secured the contracts to supply the engines and boilers for two steamers to be built to the order of the East Asiatic Steamship Co., Copenhagen. One steamer will be built by the Northumberland Shipbuilding Co., Willington Quay-on-Tyne, and one by Messrs. W. Dobson & Co., Walker-on-Tyne. These firms are also to build two steamers which will be fitted with Diesel oil engines. They continue very busy with condensing plant work and are also busy in their speciality department.

Whitby.

The s.s. *Red Cross*, 2,877 gross tons, owned by the Rowland and Marwood Steamship Co., Ltd. (Mr. C. Marwood, manager), Whitby, has been sold through Messrs. T. Pinkney & Sons, for about £12,000.

Middlesbrough.

Messrs. Sir Raylton Dixon & Co., Ltd., Cleveland Dockyard, are very busy with work in hand. The two intermediate steamers to be built by them for the Booth Steamship Co., Ltd., will be engined by the North Eastern Marine Engineering Co., Wallsend-on-Tyne.

Messrs. W. Harkess & Sons, Ltd., continue to be busy on both old and new work; they have just finished the t.s.s. *Candelaria*, peculiarly adapted for carrying logs, having very large hatches, for the Brazilian coast trade, being 265 ft. by 40 ft. by 11 ft. 3 in., carrying 1,100 tons deadweight. She did over 10¼ knots on trial, an excellent result.

Messrs. Smith's Dry Dock Co. are extremely busy, having the following steamers under repair or overhaul: s.s. *Calaba* and *Neuralia* of the British India Co., the Hull liner *City of Agra*, and Prince liners, *Spanish* and *Tudor Prince*, are in dock. They have, as a sub-contract from Messrs. Swan, Hunter & Wigham Richardson, the first electric ship, the s.s. *Tynemount*, of about 2,400 ton deadweight, the electricity being generated by two oil engines.

Messrs. Richardsons, Westgarth & Co., Ltd., are reported full up with marine and land engine contracts to keep them busy throughout the year. They are also very busy in their speciality departments.

Stockton and Thornaby.

Messrs. Craig, Taylor & Co., are still very busy, having a sufficient amount of work on hand to keep them busy for some time to come.

Messrs. Richardson, Duck & Co., have a good amount of work on hand; they are reported as likely to secure a contract for a cargo steamer, tenders for which are now in the open market.

Messrs. R. Ropner & Sons continue to be very busy and are reported as expecting an order for a cargo steamer for foreign account. Work on hand will keep them busy this year.

Messrs. Blair & Co. have a very large amount of work on hand, principally for steamers building on the Tees and Wear; all departments are fully employed.

THE HUMBER AND DISTRICT.

(*From our own Correspondent.*)

Hull and Australia Trade.—On April 15th, the Premier of South Australia, the Hon. A. H. Peake, and the Speaker of the House of Assembly, the Hon. L. O'Loughlin, made a tour of the Hull Docks. A number of prominent officials accompanied these gentlemen, who were the guests of the Hull Chamber of Commerce. A locomotive, with a truck attached, conveyed the visitors round the new Joint Dock, where the steam navvies are still at work lifting tons of earth in connection with the excavations. Though much remains to be done, it was stated that the water would be let into the dock this year. The visitors were much impressed with all they saw of the facilities of Hull and after a fairly exhaustive tour they proceeded, after calling at other places of interest on the way, to the Guild Hall, where they were entertained to luncheon by the Mayor, Alderman John Brown. Replying to the toast of his health the Premier thanked the Mayor for his hospitality, and said they had been shown a large part of the port; personally he could not but admit that he had been very much impressed by the magnitude of the works they had in hand. There was this splendid note behind it all, it showed the great confidence they had in the future of their city. He hoped that that confidence would be thoroughly justified, and that in the future they would see the produce of Australia coming to Hull, to be distributed among the millions of people in the country. He would do his best in that respect.

Mr. O'Loughlin also responded and said that until that day he had no idea that Hull was such an important port, and the city was as important, and as live a community as any they had seen since they landed in England. The Joint Dock was going to make Hull a still more important place, and when they returned to Australia they would not only be able to tell the authorities how nicely they had entertained them, but what a grand place they had. He joined with the Premier in thanking them sincerely for the cordial reception accorded to them. The Mayor, in reply to his health proposed by the Premier, said they were honoured by having such distinguished visitors from the colonies; they hoped that the facilities Hull possessed would link them up more strongly with the Australian Colonies, and that Hull would be regarded as the golden gate-way of the East to the West for Australian produce.

The North East Coast Engineering (Works), Hull, Ltd., have been fairly busy during the month on the following steamers:—S.s. *Parana*, built new steel house on quarter deck for hospital purposes, fitted internally with up-to-date appliances for the sick passengers, also other extensive repairs to passenger accommodation, and repairs in the engine-room and stoke-hold executed; s.s. *Remembrance*, heavy repairs to life-boats and sundry repairs on deck and engine-room, also have done repairs on s.s. *Indra* and s.s. *Rodney*, and work on several other steamers in the docks.

Messrs. Stewart & Craig, engineers and ship repairers, have been busy during the month on the following vessels:—S.s. *Annie Therese*, s.s. *Aasta*, s.s. *Ellik*, s.s. *Haagfrada*, s.s. *Alfred Dumois*, the latter fitted out for the banana trade, built new 'tween decks, and four bulkheads, also engine repairs, and several other small jobs executed.

Messrs. Cochrane & Sons, Ltd., shipbuilders, Selby, are still exceedingly busy, building trawlers, coasters, tugs and barges for various parts of the country, and have sufficient work in hand to last for the whole of the year. They have several trawlers fitting out now in the Hull Docks preparing for trial trips, the engines and boilers being fitted on board by Messrs. Amos & Smith, Ltd., and Messrs. C. D. Holmes, Ltd., of Hull.

Mr. John Clarke, formerly superintendent engineer for the R.M.S.P. Company on the north-east coast, has opened an office at 39, Savile Street, Hull, as consulting engineer and marine surveyor. Mr. Clarke has been connected with the Hull Central Dry Docks as engineer-manager and was also general manager for the Northern Marine Engineering Works at South Shields. He has had a long sea-going experience and hopes to secure a share of the work at Hull and Humber ports, from underwriters and shipowners.

Messrs. Earle's Shipbuilding and Engineering Co., Ltd., are keeping fairly busy with new ships on the stocks for Wilson Line and outside steamship owners. The new s.s. *Frederiko Glavig* (see launch section April number) built to the order of the Navigazione a Vapore Unione, Dubrovik, Austria, has run her trial trips very successfully and has been handed over to the owners. The firm's four patent slips have been kept fully employed, the engine works and all other departments are busy. The Finnish R.M.S. *Polaris* has undergone very extensive repairs and has also received three new boilers, fitted with Howden's forced draught. All repairs, etc., have been under Lloyds' Survey. The steamer will undergo a trial trip in a few days time.

Messrs. Cooper & Co., Ltd., engineers and boilermakers, have had a fairly busy month with repair work on steamers throughout the several docks. The branch shop at Alexandra Dock has had a fair amount of work. The firm's graving dock has been well employed. The s.s. *Eros* is now in dock undergoing extensive repairs in her hull, over twenty plates being renewed and other repairs. The dock is well booked up. The works at Neptune Street are busy in all departments.

Messrs. C. D. Holmes & Co., Ltd., engineers and boilermakers, are still booking orders for boilers and machinery for trawlers, coasters, tugs, etc., all departments are working at high pressure, and the department for patent winches for trawlers is busy on home and foreign orders. The branch shop, Alexandra Dock, has had a fair amount of repairs on several steamers opening out for surveys, etc. The outside staff of the works are fully employed fitting machinery in trawlers in the dock and preparing for trial trips.

Messrs. Amos & Smith, Ltd., engineers and boilermakers, are very busy with repair work at the Albert Dock Works, and the branch shop at Alexandra Dock is kept fully employed with graving dock work, etc., opening out for surveys for British Corporation and Lloyds, and also preparing for trial trips. The Company has been very successful in booking new orders, which will keep the firm busy well into 1914. The outside staff of the works are kept busy fitting boilers and engines in trawlers.

Messrs. Woodall & Co., engineers, etc., have had work on several steamers around the docks. The firm is well booked up with orders for their patent Derrick and cargo blocks, for new steamers building in different yards throughout the country. The smith department is well engaged on forgings, such as stems and sternposts for several shipyards.

Mr. Thomas Tate, engineer and boilermaker, is busy on several small coasters, overhauling engines, etc.

SOUTH OF ENGLAND AND ISLE OF WIGHT.

(*From our Own Correspondent.*)

Southampton.—The enlarged Trafalgar Dry Dock was opened last month, when the American liner *St. Louis* was placed on the blocks. The dock is now amply large enough to take the *Olympic*, and presumably the *Imperator* and the *Britannic*. In view of the constant increase in size of the ships building the dock will not be capable of taking the largest vessel of three or four years hence. In face of the above facts the speech made at the Chamber of Commerce dinner to the effect that the development of the dock estate at Woolston had been indefinitely postponed, and that the railway company were going to "rest on their laurels," comes as a very big surprise. The Woolston scheme embraced a new dry dock much larger than the Trafalgar Dock, and taking into account the great dredging scheme carried out by the

Harbour Board to ensure an adequate channel with sufficient depth to take all existing vessels and any contemplated within the next few years, the decision of the railway company is all the more remarkable. It would take at least three years to construct a dry dock of the necessary size and by this time the largest vessel afloat could not enter the Trafalgar Dock and consequently would have to go elsewhere for dry docking. This state of affairs with regard to the dry dock accommodation at this port is causing considerable speculation. The dimensions of the new vessels are not definitely known, and it is believed they are not so long as is popularly supposed and therefore that the dock will be large enough for requirements for some time to come. The fact that Lord Pirrie, the foremost advocate of the " big " ship, is on the board of the railway company should also be given its true significance.

Labour Troubles.—The members of the Amalgamated Society of Engineers at this port are still out on strike for an advance of 3s. per week, and the attitude of the employers continues firm and there is no prospect of any settlement of the dispute, which has now been going on for about six weeks.

Messrs. Day, Summers & Co., Ltd., Northam Ironworks, Southampton.—The tug *Papagaio*, owned by the Leopoldina Railway Co., Ltd., and designed and built by this firm, went on a trial last month in Stokes Bay with entirely satisfactory results. The engines indicated 385 horse-power, and the mean speed was 11 knots. The dimensions of this little vessel are—Length 80 ft., breadth 10 ft., depth 9 ft., tonnage b.m. 96. She has compound surface-condensing engines having cylinders 15 in. and 30 in., with a stroke of 24 in. The working pressure is 120 lbs. per square inch. After the completion of the trial trips the vessel left for South America. She is the fifth boat of this class built by the firm.

Messrs. J. Samuel White & Co. East Cowes, Isle of Wight. —The torpedo boat destroyer *Almirante Lynch*, the first of the six vessels building for the Chilian Navy, had a successful preliminary run on the 1st of last month. H.M.S. *Redgauntlet*, the first of two vessels for the British Navy, will shortly be launched. The firefloat for the London County Council left for London on the 3rd of April. The first of the hospital launches building for the Admiralty is being prepared for trials. Sundry vessels have completed preliminary trials, and the shops generally continue busy.

Messrs. J. I. Thornycroft & Co., Ltd., Woolston Works, Southampton.—Work is in progress on the six torpedo-boat destroyers for the British Navy, H.M. paddle tugs *Sturdy* and *Strenuous*. The *Sturdy* was delivered into H.M. service last month, after very satisfactory trials, and the second vessel will shortly be running her trials. Work is proceeding on the Diesel-engined yacht and the *St. Patrick*, a passenger and cargo steamer for Trinidad. The main deck is laid and caulked and the promenade deck is in hand. Trials are being run with the composite cargo vessel for Pern. Other work in hand embraces two lightships for Trinity House and a Canadian Customs cruiser. The usual general engineering jobs have been carried out. Amongst vessels in hand for repairs are H.M. ships *Volcano, Research, Spider, Sparrow*, steam yachts *Miranda, Caroline, Chimaera, Lantana*, troopship *Rohilla*, s.s. *A. T. Moller* and *Hansa*. A contract for extensive repairs to the s.s. *Kintauns Castle*, to be carried out after the present voyage, is the latest the firm have secured up to the time of going to press.

Messrs. Simpson, Strickland & Co., Ltd., Dartmouth, S. Devon.—This firm continue busy in all departments, and are working a night shift in the fitting shops. Barges for the Severn and Canal Carrying Co., fitted with crude oil motors, are nearing completion, also a steam tug for Brazil. A new launch delivered to Southampton was sunk by the gale on the 22nd March and is being replaced by a new boat. Delivery was promised a month after the accident.

THAMES.

(*From our own Correspondent.*)

Shipping.—The Royal Mail Steam Company pay the usual preference dividend, transfer £130,000 to reserve and £47,073 to insurance fund, with a total of 6 per cent. for the year 1912 on the ordinary stock. A new vessel has just been launched at Greenock for the Cunard Company for the London Canadian trade. This vessel, the *Andania*, is 13,000 tons, and larger than anything the Company has in the Canadian trade. The dimensions are 540 ft. by 64 ft. by 40 ft. Specially intended for emigrant traffic, the vessel will have accommodation for 520 second cabin and 1,620 third-class passengers. The General Steam Navigation Company's report shows a dividend on the preference stock of 6 per cent. and the same on the ordinary shares. The Company's fleet consists of 47 steamers sea going, of 54,840 tons, and four passenger boats, 1,739 tons.

New Channel Route.—A syndicate has been formed with Lord Aberconway at its head for the purpose of establishing a line of boats from Tilbury to Ostend. The Midland Railway will use the new line in their outlet to the Continent. While the largest boat crossing from Dover to the Continent is only 1,680 tons, the new vessels will be of 4,200 gross tonnage and be fitted with turbine engines. A start will be made with three boats, two of which will be built by Messrs. Jno. Brown and Co. and the other by Palmer's Shipbuilding & Iron Co., Ltd. It is probable a day service will be started in the summer and the boats brought up to London Bridge.

Port of London Authority.—The Authority has held its first meeting after the election. Lord Devonport was re-appointed chairman for three years and Lord Ritchie, of Dundee, vice-chairman. The Admiralty, Board of Trade, London County Council, City Corporation and Trinity House all appoint members, while the elected members represent vessels and goods, with one member for the wharf users. At the head of those for vessels was Sir Owen Philipps. The chief engineer of the Authority, Mr. F. Palmer, having resigned, his services have been retained by appointing him consulting engineer, and Mr. C. R. S. Kirkpatrick, the chief assistant, has taken his place as chief engineer.

London Lightermen.—The report has now been presented to the Board of Trade in favour of the by-laws made by the Port Authority being confirmed, and thus abolishing the monopoly hitherto held by the licensed watermen and lightermen working within the limits of the Port. The Board has adopted the recommendation. The effect of this change is already evidenced by meetings the men have held in protest.

Deptford Market.—The foreign cattle market at Deptford, on which there has been a deficit for the past three years, is giving the City Corporation some concern, and a report has been presented as to partly closing the market for its present purpose and turning it into a refrigerating area. Shortly, therefore, we are likely to hear of some change in this direction, the ground covered being 28 acres with wharfage.

West London Training Brig.—The Admiralty has leased H.M.S. *Stork*, 450 tons, to the Kensington Navy League, for the purpose of training working lads for the Navy and mercantile marine. The vessel was partly fitted out at Chatham Dockyard and has been towed to Hammersmith for her new service. The success attending the Kensington and Hammersmith Boys' Naval Brigade has led to this departure.

MERSEY AND MANCHESTER SHIP CANAL.

(*From our own Correspondent.*)

ONCE again have the excellent facilities for both building and launching large tonnage been demonstrated by the launch of the Norwegian liner *Bergensfjord* on April 8th. No shore or sea anchors are used in connection with Mersey launches, tugs only being used to bring the vessel to and to tow her into wet dock.

Messrs. Cammell, Laird & Co.—Great activity prevails upon the *King Orry*, recently launched at Birkenhead the machinery, boilers, etc., having been placed on board and the casings all closed up. The saloons and deck erections are being rapidly completed and it is expected that this fine vessel will be placed on the service early in May. The *Kristianiafjord*, which was launched on November 23rd, and is expected to take up her sailings between Kristiania and New York in a few weeks' time, is receiving her finishing

touches, while the *Bergensfjord* is also in the wet basin receiving her machinery. This latter vessel was christened by Madame Bang, wife of Herr Cath Bang, chairman of the Norske Americalinje Company, at the launching ceremony, and a description of the vessel will be found under the Launches and Trial Trip section. Good progress is being made with the hull and machinery of the two P. and O. steamers, also the Canadian train ferry. H.M. destroyer *Garland* is well advanced, having been launched on April 23rd and is now in the wet basin receiving her machinery. The meat barge *Doon* has left for South America under her own steam. Several important contracts are in hand in the repair department. The *Royal George* is making good progress, the shell plates having been renewed, a large number of men being still employed upon the work. The Canadian Pacific steamer, *Empress of China*, is now in this firm's hands, having been two years stranded in the Pacific. It is expected that this vessel will be in dock some eight months.

Messrs. H. & C. Grayson, Ltd., have had all their yards fully employed in repair and survey work, while at Garston they have in hand a lightship for Trinity House. A large number of portable deck seats are also on order, due to the new regulations. New boilers have been fitted to the Eastham ferry steamers *Pearl*, *Ruby* and *Sapphire*. In the Brocklebank dock the *John Bacon* is having extensive alterations to her accommodation, having been sold to Russian owners. The Johnstone liner *Rowanmore* and the London steamer *Birdstone* have also been in hand.

Esplen's Patent Control.—Much interest in marine circles has been aroused in this invention, which was described in our March issue. By means of this apparatus, it is impossible for the engines to be operated except as indicated on the telegraph. This appliance is engaging the attention of some of the large lines of steamers and it is about to be fitted to a large meat-carrying steamer.

The Liverpool Engineering Society.—It was announced at a meeting of this Society, on April 16th, that Mr. Francis E. Cooper will be recommended for election as president for the ensuing year, with Mr. C. E. Given and Prof. Marchant as vice-presidents.

Mersey Docks and Harbour Board.—The strike of labourers engaged on the construction of the New Gladstone Dock has now been settled and there is every prospect that the dock will be completed in time for the formal opening by the King in July.

The Manchester Ship Canal.—The Manchester Corporation has approved the promotion of a Parliamentary Bill for the object of granting a loan of £1,048,000 to the Ship Canal Company for the redemption of debentures and also £1,000,000 for the purpose of new works, etc.

The Manchester Ship Canal was for a time completely blocked by the sinking in the water way near Statham Bridge of the coasting steamship *Solway Prince*, as the result of a collision with the steamer *Rossmore* at about noon on the 22nd March. The *Solway Prince* lay right across the Canal, there being only about 40 ft. of space between her bows and the canal bank. She was badly cut into between the forecastle and the bridge and lay with her midships unsupported. The Liverpool Salvage Association was at once communicated with and they lost no time in getting to work. By the morning of the 26th March it was reported that the obstructing vessel had been shifted to the side of the Canal, so as to free the passage. But it was not till the 12th April that it was reported that the work of lifting and pumping her out was completed. A day or so later she was safely docked at Manchester for inspection and repair.

The Bibby Line.—Capt. Ernest Burnett, R.N.R., has been appointed Marine Superintendent in succession to the late Capt. Wadley and Mr. Richard Hall, who has supervised the building of the new vessels at Belfast, has been appointed Superintendent Engineer, in place of Mr James Johnstone, who retired at the end of 1912.

The Atlantic Ice Patrol.—The ice scout ship *Scotia* is now stationed in the ice district for the purpose of observing the movements of the ice fields and sending wireless reports thereon. Some twenty-three lines of steamers plying the North Atlantic are combining to defray the cost of maintenance.

The Cunard Line.—A magnificent site on the water front has been secured by this company for new offices and work has been commenced. It is situated between the Royal Liver Building and the Mersey Dock Board offices. The *Andania*, launched from Messrs. Scott's on March 22nd, will have accommodation for 520 second-cabin and 1,620 third-class passengers. It has been decided by the directors to recommend a dividend of 10 per cent. on the ordinary shares for 1912.

The Allan Line.—This Company also had a launch on March 22nd, the *Alsatian* being launched from Messrs. Beardmore's yard at Dalmuir. A cellular double bottom is carried right fore and aft and extended an exceptional height up the sides; transverse and longitudinal bulkheads, also watertight decks are provided. Striking features of this vessel are the cruiser stern and the oval funnels with Admiralty tops.

The Canadian Pacific Railway.—The *Empress of Russia* arrived in the Mersey from Glasgow on March 24th. After lying in the Birkenhead Docks she took up her passengers at the stage on April 1st and later proceeded on her round-the-world cruise *via* Gibraltar and Suez to Japan and Vancouver. Her passengers will then travel overland to Quebec and so to Liverpool by another of the "Empress" boats. A striking feature of the vessel is the three cream funnels and the cruiser stern.

NORTH-WEST OF ENGLAND.

(*From our own Correspondent.*)

Barrow-in-Furness.—Very considerable attention has been paid during the past month to the work of completing the Japanese cruiser *Kongo*, which sailed from Barrow on Sunday, April 20th, to undergo her trials on the Clyde. First of all she steamed to Belfast, where she has been dry docked, and when this work is completed she will go to the Clyde and run her trials on the measured mile off Skelmorie. Confident anticipations of her success are indulged in. She is a larger vessel than the *Princess Royal*, built at Barrow for the British Admiralty, and she is the first ship to carry 14-inch guns. Of course warships are now being built which will carry 15-inch guns, and there is some talk of guns being made of even higher calibre. When the *Kongo* has completed her trials she will return to Barrow to be overhauled, and then will leave for the Far East. It is expected that the *Kongo* will be able to get through her trials in a month, and return to Barrow by the 21st of May. H.M.S. *Delhi* is now assuming large proportions in the shipyard and when workmen now engaged on the *Kongo* are at liberty they will be employed on this vessel in order to advance her launching date. The Turkish battleship *Reshad V.* is also making satisfactory progress and will be ready for launching as soon as, if not sooner than the *Delhi*, especially now that arrangements have been almost completed with the men as regards the amount of overtime they are prepared to work.

Overtime.—The question of overtime in many departments of the Vickers' yard has been receiving attention during the month. Work is so brisk and plentiful that overtime is essential, especially in view of the fact that it is difficult to get as many men on the several jobs as are necessary to complete deliveries within the time specified when the contracts were signed. In one or two instances arrangements have been made already, and it is expected that an agreement will soon be come to with the members of the Boilermakers' Society. It is reported that the boilermakers have been working 18·8 per cent. fewer hours than the ordinary week. Their secretary has written a report urging the men to put in fuller time, and it is strange, seeing the immense amount of work in hand, that the men do not take more advantage of their opportunity of making hay while the sun shines so as to be able to meet the exigencies of quiet times which are sure to come some day, but it is unfortunately the case that the men feel they have done enough work when they have earned a certain sum of money, and play the rest of their time. At any rate it is expected the overtures now proceeding will result in the men being allowed by their Society to put in a given amount of overtime per week, and even to increase their hours of working still further when the masters find it impossible to get as many men as they need for the orders they have in hand.

The Brazilian Monitors.—The first of the three monitors building by Vickers, Ltd., for the Brazilian Government, will be launched from the Barrow yard early in May. Interest is being shown in the event by reason of the fact that these vessels have been built broadside on and will be so launched in Walney Channel. The other two monitors will also soon be launched. They are required for river service and for protection of national interests in the great waterways of Brazil.

Light Cruisers.—Much progress is now being made with the construction of the two light cruisers building for the British Admiralty, the *Phaeton* and the *Penelope*. This is a class of vessel with which Messrs. Vickers, Ltd., have had considerable and successful experience, and they are certain to turn out very satisfactory vessels.

Submarines.—The Vickers firm are very busy in the submarine department, having a considerable number of orders in hand for the British Admiralty. Very much interest is centred in the new type of submarine, which is to have a displacement of 1,200 tons and the speed afloat of a cruiser of a few years ago. She will be mounted with four powerful guns and also with quick-firing guns which she can discharge and immediately afterwards sink out of harm's way. Since heavy oil engines have been adopted for submarines there is no risk of any of the deplorable accidents which happened to the earlier submarines built for the Navy. It is now reported that two other firms are beginning to build submarines, but these will probably be vessels of a different type from those built by Messrs. Vickers, Ltd., as they have the patent rights of the vessels built for the Navy up to now, and have proved very successful, indeed so successful that there is talk of their having supplanted the destroyers, up to now regarded as so essential an element in naval warfare.

Airships.—The policy of the Admiralty as regards airships has now been definitely announced. A few airships, either rigid, semi-rigid or non-rigid, will be built at, at any rate, three of the yards in the country during the current year, and on the success of these the Admiralty are prepared to spend a large sum of money in the building of a large fleet. It is already known that Messrs. Vickers, Ltd., have bought out the rights of the Parseval airship, which has proved a very great success in Germany, and which has been approved by the German Government, and it is known that one of these vessels will be built at Barrow, while probably a Parseval airship built in Germany is likely to be taken to pieces and sent to Barrow to be rebuilt. The Admiralty have agreed to spend £150,000 this year in experimental airships, and after they are satisfied that these are the class of vessels that is likely to be useful they may later on bring in supplementary estimates involving a much larger expenditure in this direction.

Engineering.—There is an immense amount of work in hand in the engineering shops of the Vickers' firm at Barrow. This is especially the case as regards marine engines, and there is a growing briskness in the work of building oil engines, which are now recognised as certain to bring about big changes in the present methods of propelling ships economically. There is also in hand a very big programme of orders for gun mountings, and the work in this branch is all the more exacting at present as the growth in the size of guns has necessitated bigger mountings and new designs. The fact has further made it essential to increase the area of the workshops and the putting down of modern up-to-date machinery. Successful experiments are reported as to the larger guns which are now being built, and of course a gun is only efficient so far as its mountings are perfect. A vast army of men are employed at Barrow at present in this wonderfully active department.

Shipbuilding Material.—Prices are very high for shipbuilding material. Ship plates are at £8 10s., and boiler plates at £9 5s. to £9 10s. per ton.

BELFAST.

(From our own Correspondent.)

Work in Progress.—According to Lloyd's returns for the quarter ended 31st March, there were on that date twenty-six vessels building in Belfast, with an aggregate tonnage of 330,390, compared with twenty-six with a tonnage of 328,550 in the corresponding quarter of last year. These figures, if not a record for the port, certainly constitute one of the highest totals yet reached in Belfast.

Messrs. Harland & Wolff.—An idea of the size of some of the vessels building at the Queen's Island may be gained from the fact that out of the 330,390 tons above referred to over one-third is comprised in three vessels building in the north end of Messrs. Harland & Wolff's yard. These are the White Star leviathan *Britannic*, and a big liner each for the Holland-America Co. and the Red Star Line. None of these vessels will be put in the water this year, and the Queen's Island output being therefore restricted to the south end of the yard during 1913, Messrs. Harland & Wolff's tonnage for the current twelve months will fall short of some of their big years. They are, however, fully booked up with orders for some years ahead, so that with these three vessels to be launched next year, together with at least one steamer from each of the slips in the south yard, it is safe to predict that in 1914 Messrs. Harland & Wolff will establish a fresh record for output of new tonnage. On 10th April they launched the triple-screw steamer *Katoomba* for Messrs. M'Ilwraith, M'Eachern & Co. Her dimensions are 446 ft. in length, beam 60 ft. 4 in., and gross tonnage over 9,000. Her propelling machinery will be of the reciprocating and turbine combination type. In this connection it is worthy of note that all the vessels at present on the stocks in Messrs. Harland and Wolff's yard are to be fitted with combination machinery. Quite a number of steamers having this system of propulsion are afloat, including, of course, the White Star liners *Olympic* and *Laurentic*, and the success of this type of machinery, both in the matter of reliability and as regards economy, is a well-established fact. The keel of a big vessel for the Atlantic Transport Company has already been laid down in the berth vacated by the *Katoomba*. The next launch from the Queen's Island will be from the adjoining slip early in May. This vessel is the mail and passenger liner *Andes*, building for the Royal Mail Steam Packet Company. Since last month's issue was published Messrs. Harland & Wolff have acquired a further extension of premises on the Clyde, seven acres of land having been purchased. This ground is in the immediate vicinity of their Govan shipyard, and will be used for engineering purposes.

Messrs. Workman, Clark & Co.—This firm also is fully booked up with orders, and have sufficient work on hand to keep things going in full swing for a long time ahead. In fruit carriers alone they have commissions to build which will occupy several years to carry out. On 10th April, they launched the second of the huge caissons which they have built to Admiralty orders for the big new dry dock at present being constructed at Portsmouth for the accommodation of the new super-Dreadnoughts. Both of these structures are fitted with machinery for working in the most expeditious manner, the arrangements for sinking and raising including a compressed-air emergency system, with auxiliary gear consisting of a couple of Admiralty-pattern Downton pumps. On 28th March Messrs. Workman, Clark & Co. put in the water a twin-screw fruit steamer named *Tenadores*. She is a sister-ship of the *Pastores*, which left Belfast in January, and is 486 ft. long, with a gross tonnage of about 8,000. Two sets of quadruple-expansion engines have been fitted, steam being supplied by three double and one single-ended boilers.

Dry-docking.—Before these notes are in print the Japanese battleship *Kongo* will have arrived from Barrow to be docked in the big Belfast Graving Dock, where she will receive her final touch up and painting.

Harbour Improvements.—The Harbour Commissioners have decided to erect a shed at the south end of the Queen's Quay, 600 ft. long and 70 ft. wide, at an approximate estimated cost of £11,400. It will be some little time though before building operations are started upon. This will necessitate the disposal of a certain part of the coal trade elsewhere, but in regard to this, definite arrangements have not yet been made. The whole question of port accommodation is in fact having the careful consideration of the Commissioners, there being a good deal of congestion in some quarters.

New Harbour Commissioner.—At the recent election, all the retiring members of the Board, with the exception of one, who did not seek re-election, were returned. There was

some competition for the vacant seat, the successful candidate being Mr. Andrew Gibson, who recently retired from the post of Belfast agent to Messrs. G. & J. Burns.

Londonderry.—The first launch by the new firm—the North of Ireland Shipbuilding Co.—took place on 10th April, the vessel put in the water being one 250 ft. long, built for the Canadian Lakes. The new steamer, which has been constructed on the Ayre-Ballard system, will have propelling machinery supplied by Messrs. Richardsons, Westgarth and Co., Ltd., Middlesbrough. The next vessel to be launched will be one of similar dimensions for the same service, while a steamer of much greater size—8,000 gross tonnage—is also under construction.

THE BRISTOL CHANNEL.

(From our own Correspondent.)

Cardiff.

THE exceptional activity which has characterised the ship-repairing and engineering trades of this district for some time past has been fully maintained during the month. There were three factors conducing to this end. First, the amount of tonnage visiting the wet docks has been exceptionally good. Secondly, the boisterous weather which has prevailed has had the effect of producing quite a crop of damage repairs. Thirdly, but by no means the least as a factor of importance, is the fall that has been experienced in freight rates. The downward tendency of outward freights from South Wales has induced shipowners to utilise the present time for the purpose of having their vessels overhauled. During the past year freight rates ruled at such abnormal levels that shipowners not unnaturally wished to participate to the full in the good times. Repairs that were not absolutely necessary for the vessels' safe navigation were deferred, and now that freights have fallen, the owners after reaping a good harvest are putting their tonnage in good order. Consequently business recently has been decidedly good and unmistakable signs are not wanting to show that the dry-dock owners' and ship-repairers' turn has arrived. Very few dry docks have been empty for some weeks past. At Cardiff vessels were awaiting their turn, although rapidity of execution has been well maintained. At the time of writing the pressure has relaxed somewhat, owing to a temporary decline in the tonnage arrivals, and in consequence some rapid despatches have been given to vessels under repair.

Mountstuart Dry Docks, Ltd.—This most prosperous concern has enjoyed a large accession of trade lately, and the extent of the activity may easily be judged by the number of steamers continually clustered round its jetties and in the dry docks. Thirty-three steamers have been docked by this Company during the month and every branch of repair work kept fully employed. The heaviest repairs have been on the steamers *L. H. Carl*, *Pendeen* and *Robert Coverdale*. The last-named vessel, having received considerable ice damage, was completed in the remarkably short time of seven days. Among the vessels under overhaul here were the Government transport *J. Duncan* and the River Plate liner *Oriana*. One of the motor barges built for Spillers & Bakers, Ltd., underwent a very successful trial trip on Tuesday, 15th April. These barges are to be used to transport grain from ships in the docks to the mills of the firm situated on West Bute Dock.

Channel Dry Docks and Pontoon Co.—This Company, which controls several dry docks and pontoons, received an exceptional share of the harvest and has been most busily employed on a large number of steamers.

The ship-repairing firms of Elliott & Jeffery, T. Diamond and Co., John Shearman & Co., Junction Dry Dock Co., and Hill's Dry Dock Co., have all been actively engaged, the most notable repairs being the extensive stranding damage to the steamer *Rossall*, and heavy collision damage to the steamer *Tempus*.

Steam Pilot Boat Co.—The steam yacht *Saxon*, which is the third boat purchased for the pilot service, arrived here from Southampton a few days ago. She is built of steel, and after undergoing some necessary alterations to adapt her for her new employment, she will take her place in the steam service which will be inaugurated during the summer.

Largest Ship's Cable.—There has been completed recently in this district the largest ship's cable ever constructed. It has been manufactured by Messrs. Brown, Lenox & Co., at Pontypridd, for the mammoth Cunard liner *Aquitania*, now fitting-out on the Clyde. Each link weighs 173 lbs., and the diameter of the bar from which the link is made is $3\frac{7}{8}$ in. The twenty-two lengths of which the cable consists have undergone a tremendous test at Lloyd's Bute Proving House, Cardiff.

Penarth and Barry.

Accident to Spanish Steamer.—The crew of the Spanish steamer *Ciuata* had an exciting experience recently. During a hard easterly gale the vessel, which was loaded with iron ore, was driven ashore on the mud when endeavouring to enter Penarth Dock. She was expected to float on the next tide, but the water had risen and encroached on her deck before she overcame the powerful suction of the mud and released herself. In the meantime another steamer had been driven by the strong wind against her, with resulting damage to both.

Barry Graving Dock Co.—The two docks owned by this concern have been fully employed during the month and there seems to be no decline in the activity displayed by this Company for some time past.

Messrs. C. H. Bailey have been enjoying a most extraordinary run of work during the month, judging by the number of vessels they have had in hand. Amongst the number have been the steamer *Burbridge*, with extensive damage repairs, the steamer *Trader* with damaged plates, which will detain her in the dry dock about four weeks, and thirteen vessels in the wet docks.

The Channel Dry Dock Co.—This Company has an important repair job here in hand at present. The work includes the renewal of about thirty bottom plates and fairing about thirty-five others on the Greek steamer *India*, which dragged her anchors and got on the rocks here last month. It is not expected that she will be out of the dock before Whitsuntide.

Newport.

There has been a long list of repairs at the establishments here, but the boisterous weather rendered repairs difficult in the dock extension. The extension is very open and the rough weather rendered it almost impossible for open boats to take men and materials alongside some vessels. The Channel Dry Dock Co. has secured the privilege of employing a motor launch, and one will shortly be placed in commission, thus obviating any delay owing to rough weather.

Bristol and Avonmouth.

Dredging Plant.—The authorities have decided to renew their dredging equipment by the acquisition of a large suction dredger, two hopper barges, and a powerful tug for towing purposes, at a cost of about £43,000.

Resumption of Shipbuilding.—It is understood that extensive shipbuilding operations are to be resumed at Bristol. Preparations are now being made at Messrs. Charles Hill and Son's yard at the City Docks for the construction of two steamers for the coasting trade, one of about 1,500 tons capacity, and the other of 1,200 tons.

LAUNCHES AND TRIAL TRIPS.

LAUNCHES—English.

Karroo.—There has been successfully launched from the Hebburn shipyard of Palmers' Shipbuilding and Iron Co., Ltd., the large screw steamer *Karroo*, which has been built to the order of the Bucknall Steamship Lines, Ltd. The vessel, which is about 450 ft. long, is designed for carrying general cargo, her deadweight capacity being about 10,000 tons. She is to be classed 100 A1 under Lloyd's special survey. Water ballast is carried in cellular double bottom all fore and aft, and in deep tank. The vessel has six large cargo hatches, and is to be fitted with triple-expansion engines supplied by the builders, with three boilers having a working pressure of 220 lbs. She will be fitted with wireless apparatus.

Rosalind.—There has been launched at Wallsend by Messrs. Swan, Hunter & Wigham Richardson, Ltd., the oil tanker *Rosalind*. She is a steel two-decked ship, built on the Isherwood system of longitudinal framing, and will carry petroleum in bulk. The vessel is being built for the Oil Tank Steamship

Company, Liverpool, the managing owners of which are Messrs. C. T. Bowring & Co., Ltd. This is the twelfth ship that the same builders have constructed for these owners, and they still have further work in hand for them. The deadweight carrying capacity of the *Rosalind* is 9700 tons. She is 432 ft. long, 54½ ft. broad, and has a moulded depth of 32 ft. 8½ ins. The oil holds are divided by 15 transverse bulkheads, and also by longitudinal bulkheads. These oil holds will have steam-heating coils to thin heavy oils that may be carried. Provision is also made for thoroughly cleaning the holds by steam, when required. The single-screw engines and boilers have been built by the Wallsend Shipway and Engineering Company. The engines are of the inverted direct-acting triple-expansion type, with a pressure of 180 lb. per square inch.

Novgorod.—On March 15th, there was launched at Sunderland the steamer *Novgorod*, which has been built for the Russian Volunteer Fleet. The principal dimensions of the vessel are 300 ft. by 50 ft. 6 in. by 30 ft. 5 in. She will be able to carry a good deadweight cargo on about 24 ft. 6 in. draught, and is fitted out in a handsome manner with dining saloon and state-rooms for 30 first-class passengers, with accommodation for about 1,100 third-class passengers, in the 'tween decks. The equipment of cargo appliances is most complete and up-to-date. The vessel will be lighted throughout with electricity on a generous scale, and will be equipped with an installation of wireless telegraphy. The propelling machinery, which will be supplied by Messrs. Swan, Hunter & Wigham Richardson, Ltd., is of ample power, and a good speed is confidently anticipated.

Burcombe.—On March 20th, Messrs. Richardson, Duck and Co., Ltd. launched from their yard a steel screw steamer of the following dimensions, *viz* :—Length over all, 373 ft.; breadth extreme, 50 ft.; depth moulded, 23 ft. 10½ in.; tonnage, gross, about 3,500 tons; deadweight, about 6,200 tons. This vessel, which has been built to the order of Messrs. Burdick & Cook, of London, will class 100 A1 in Lloyd's Register, and has been built under special survey. She is of the single-deck type, and has a cargo poop, long bridge amidships with accommodation for captain, officers and engineers in steel houses on bridge deck, and topgallant forecastle for crew. A cellular double bottom throughout and forward and after-peak tanks are fitted for water ballast, and equipment includes large horizontal multitubular donkey boiler, six steam winches, steam-steering gear, steam windlass with quick-warping ends, stockless anchors and all modern improvements for facilitating loading and discharging. The engines by Messrs. Blair & Co., Ltd. have cylinders 24 in., 40 in. and 66 in. by 45 in. stroke, steam being supplied by two single-ended boilers having a working pressure of 180 lbs. This makes the twentieth steamer that has been built to the order of Messrs. Burdick & Cook, and the twelfth consecutive steamer built for them by Messrs. Richardson Duck & Co., Ltd.

Renteria.—On March 20th, Messrs. Osbourne, Graham and Co., launched from their yard at Hylton, Sunderland, the steel-screw steamer *Renteria*, which they have specially constructed to the order of Messrs. Fearnley & Eger, of Kristiania. This is the sixth vessel they have constructed for this firm and the third of the Monitor type. Her principal dimensions are 255 ft. by 37 ft. 9 in. by 20 ft. 6 in. moulded, and the vessel is of special interest, owing to the fact that she has been built on the Monitor patent system, and makes the sixth vessel of this type built by this firm. She is of the single-deck principle, with poop, long bridge with accommodation on top, and forecastle, and very complete specifications. Rooms for the Captain and Officers' are tastefully fitted out in hardwood, and are of large size. The vessel carries 2,850 tons on a very shallow draft, and is equipped with the most modern deck appliances, there being amongst other items five steam winches by Messrs. James Lynn & Co., and a multitubular donkey boiler by Messrs. Riley of Stockton. She has been constructed under special rules to Norske Veritas Survey, and also fulfils the requirements of Sjfartskontoret Rules. Water-ballast is in both peaks and throughout double-bottom, thus enabling the steamer to make long passages light with the greatest safety. Engines which have been designed to drive the vessel at a high rate of speed are being supplied by Messrs. George Clark, Ltd., having cylinders, 19 in., 30 in. and 50 in. by 36 in. stroke, with two boilers 12ft. 6 in. by 10 ft., 180 lbs. pressure. During construction the vessel has been under the supervision of Mr. J. Houston, of Sunderland.

R.R.S.—On March 25th, there was launched from the yard of Messrs. Cochrane & Sons, Ltd., shipbuilders, Selby, a steel screw dritter, the principal dimensions being, 110 ft. by 21 ft. by 11 ft. moulded. She is the largest dritter yet built for this country, has a bow rudder, and will be fitted with all the latest improvements for drift net fishing. The vessel has been built to the order of Mr. R. Sutton, of Great Yarmouth. She will be fitted with powerful triple-expansion engines 9¾ in., 15 in. and 22 in. by 16 in., by Messrs. Elliott & Carrood, Ltd., of Beccles.

Tasmanian Transport.—On March 26th, The Northumberland Shipbuilding Company, Limited, Howdon-on-Tyne, launched the finely-moulded steamer *Tasmanian Transport*, which has been built to the order of Messrs. Furness, Withy and Company, Limited, West Hartlepool, for the Houlder Line Ltd., London. The vessel is about 400 feet long by 53 feet beam by 30 ft. 6 in. deep, of the single-deck type and has been built under special survey to the highest class at British Corporation. She is fitted with long bridge, poop and topgallant forecastle. Accommodation in steel houses on bridge deck. There are ten steam winches by Messrs. Clarke, Chapman & Co., Ltd., a large number of cargo derricks, and steam windlass by Messrs. Emerson, Walker & Thompson Bros. The usual water ballast arrangements for light passages are fitted. The machinery will be supplied by Messrs. Richardsons, Westgarth & Co., Limited, of Sunderland, consisting of engines with cylinders 25 in., 40 in., 68 in. by 48 in. stroke, three large boilers with 180 lbs. pressure. The vessel will carry over 8,000 tons on a light draught and steam about ten knots loaded at sea. During construction the vessel has been superintended by Mr. Ross and Mr. Flowers.

Florazan.—On April 3rd, the s.s. *Florazan* was successfully launched from the shipyard of Messrs. Short Brothers, Limited, Pallion, Sunderland. She has been built on the Isherwood patent system to the order of the Liverpool Shipping Co., Ltd., of Liverpool (Messrs. H. Fernie & Sons., managers), her dimensions being length 399 ft. 6 in., beam 51 ft. 6 in. and depth moulded 29 ft. 11 in. and is designed to carry a cargo of 7,700 tons on a moderate draught with fine co-efficient. The vessel, which will take Lloyd's highest-class, is double decked with cargo poop and bridge and topgallant forecastle. A large quantity of water ballast is provided in the double bottom, which is deepened at after end and in fore and after peak tank. Five large cargo hatches are fitted; served by ten derricks, stopped on tables at masts and swung from crosstrees above. Nine steam winches, steam windlass, and steam steering gear in engine room driven from teak wheelhouse and connected by chains and rods to double-armed quadrant on rudder head, are supplied, taking steam from the main boilers. Right and left-hand screw gear and rudder brake are also supplied. The saloon, neatly panelled in polished oak, is situated in a large steel house on fore end of bridge deck, with rooms for officers and stewards; captain's room and chartroom are in house above; the engineer and apprentices are berthed in houses abreast of casing on bridge deck and the crew in the forecastle. The propelling machinery will be installed by Messrs. George Clark, Limited, of Sunderland, and consists of triple-expansion engines, with cylinders 26 in., 42 in., 70 in. diameter and 48 in. stroke, taking steam from three large boilers of 180 lbs. pressure. While under construction the hull and machinery have been under the supervision of H. F. Payne, Esq., and Capt. J. W. King, of Liverpool.

North Pacific.—On April 3rd, Messrs. Joseph L. Thompson and Sons, Limited, of the North Sands Shipbuilding Yard, Sunderland, launched the above-named vessel, which has been specially constructed to the order of Messrs. The Pacific Shipping, Ltd., of Sunderland, and is the fifth vessel Messrs. Thompson have constructed to the order of this firm. The principal dimensions are :—Length 394 feet, breadth extreme 53 ft., and depth moulded 25 ft. 4 in. The vessel has been constructed to Lloyd's highest class, and is of the single-deck type, with a complete shelter deck, and has been designed to have a large deadweight carrying capacity on a moderate draught of water. In addition to the usual transverse bulkheads, longitudinal steel bulkheads are fitted, with wood in way of the hatchways. The accommodation for the captain, officers, engineers, etc., is in houses amidships, the seamen being berthed forward and the

firemen berthed aft. There are nine steam winches, ten derricks and large hatchways, ensuring the rapid handling of cargoes. The deck machinery is supplied with steam from a large marine type donkey boiler. The lifeboats are of extra large size, complying with the latest requirements of the Board of Trade. The propelling machinery has been constructed by Messrs. John Dickinson & Sons, Ltd., of Sunderland, the sizes of the cylinders being 26 in., 42 in., 71 in. by 48 in. stroke, with three large boilers working at 180 lbs. pressure. Mr. Arthur B. Greenwell has superintended the construction of the ship and engines.

Bergensfjord.—On April 8th, the second of two twin-screw passenger and emigrant steamers, now building by Messrs. Cammell, Laird & Co., Ltd., to the order of the Norwegian-American Line, of Christiania, was launched at Birkenhead, the vessel being named *Bergensfjord*. The *Bergensfjord* is 510 ft. long and 61 ft. broad, and has a gross tonnage of about 11,000 tons. Accommodation is provided for 105 first-class, 216 second-class, and 700 emigrants. The vessel is built with a double bottom throughout, divided into twelve water-tight compartments. The *Bergensfjord* is built to Lloyd's and Norske Veritas rules, and also to the requirements of the British, Norwegian and American Boards of Trade. The propelling machinery consists of two sets of twin-screw, direct-acting, quadruple-expansion engines, having cylinders 26, 37½, 53 and 75 in. by 51 in. stroke, designed for running at about 95 revolutions per minute. The engines are on the balanced principle, and are capable of developing about 8,500 i.h.p. The whole of the shafting in connection with the machinery is being supplied by Messrs. Cammell, Laird's own works at Sheffield. The propellers are of the built type, with cast-steel bosses and blades of Bull's metal. The vessel is fitted with bilge and ballast pumps of extra large capacity, as well as general service, sanitary and other pumps. Steam is generated in eight single-ended boilers, fitted with forced draught. The whole of the machinery has been constructed to the requirements of the Board of Trade, Lloyd's Register, the Norwegian and American Governments and the Norske Veritas. Messrs. Gray and Brace have supervised the work for the owners during the construction of the vessel; the owners have also been represented by Captain Doxrud, the marine superintendent of the Company, and by Mr. Lars Brath, their engineering superintendent. The agents of the Company in Liverpool are Messrs. Vogt & Maguire, through whom the contract for the building of the ship was made. Messrs. Wailes, Dove & Co's Patent "Bitumastic" solution and enamel have been applied throughout the bunkers.

Zeta.—On April 8th, Messrs. Irvine's Shipbuilding and Dry Docks Co., Ltd., launched from their Harbour Dockyard, West Hartlepool, the steel screw steamer *Zeta*, built for B. J. van Hengal, Esq., Amsterdam. The vessel is 342 ft. in length by 48 ft. beam extreme by 24 ft. 6½ in. depth moulded, having a deadweight capacity of over 5,300 tons. She is of the single-deck type, with poop bridge and forecastle, and is built to Lloyd's highest class. Cellular double bottom is fitted throughout for water ballast, together with fore and after peaks, the tank under the engines being arranged as a trimming tank. The vessel is constructed with deep bulb angle frames, without side stringers, giving clear holds for the stowage of bulky cargoes; five watertight bulkheads are fitted, dividing the vessel into six watertight compartments and wood shifting boards are fitted throughout the holds. Four large hatches are provided, with seven powerful steam winches worked from a multitubular donkey boiler, and all the latest improvements are included for the rapid loading and discharging of cargo. A powerful quick-warping steam windlass is fitted forward, and steam-steering gear amidships with hand-screw gear aft. The captain, officers and engineers will be berthed in houses amidships, and the sailors and firemen in the forecastle. The lighting, ventilating and sanitary arrangements have received special attention, the most improved methods being adopted throughout. The machinery, which has been constructed by Messrs. Richardsons, Westgarth & Co., Ltd., Hartlepool, consists of a set of Richardsons' triple-expansion engines, including a Contraflo condenser and temperature regulator. The cylinders are 23½ in., 38 in. and 64 in. by 42 in. stroke, and steam is supplied by two large boilers working at a pressure of 180 lbs. per square inch and built to the requirements of Dutch Law.

Portwood.—On April 8th, there was launched from the shipbuilding and repairing establishment of Messrs. S. P. Austin & Son, Ltd., Wear Dock Yard, Sunderland, the steel steam collier *Portwood*, of about 3,250 tons deadweight capacity, to the order of Messrs. Wm. France Fenwick and Co., Ltd., of London and Sunderland. She has been built under Lloyds' special survey for 100 A1 class, with large hatchways specially adapted for the owners' coal trade and has large water ballast capacity. The accommodation for the captain and officers is fitted in the bridge, engineers in after end of bridge, and crew in forecastle. The machinery will be supplied by the North-Eastern Marine Engineering Co., Ltd., Sunderland. The vessel has been superintended during construction by Messrs. Thompson, Eyres & Bryers, of Sunderland, on behalf of the owners.

Trevider.—On April 9th, there was launched from the shipbuilding yard of Messrs. John Readhead & Sons, Ltd., West Docks, South Shields, a steel screw steamer, built to the order of Messrs. Edward Hain & Son, St. Ives, Cornwall, and name the *Trevider*. The dimensions of the vessel are :—381 ft. by 51 ft. by 27 ft. by 8½ in.; she will carry a deadweight cargo of 7,850 tons on a light draught of water. She is of the improved single-deck type to Lloyds' highest class, and under their special survey, having poop, extra long bridge and topgallant forecastle, with deep girder framing and cellular double bottom fore and aft, with large after-peak tank for water ballast, holds clear of beams and other obstructions. The outfit of the ship is complete for general and grain trades, with shifting boards all fore and aft and large hatchways as feeders. A full equipment of steam winches and derricks is fitted for the rapid loading and discharging of cargoes. The vessel will be fitted with triple-expansion engines, also constructed by Messrs. John Readhead & Sons, Ltd., having cylinders 26 in., 42 in. and 69 in., with 48 in. stroke, supplied with steam from two large steel boilers working at a pressure of 180 lbs. per square inch. This is the sixty-second vessel built for the above firm by Messrs. John Readhead & Sons, Ltd.

Hermion.—On April 11th, Messrs. W. Doxford & Sons, Ltd., launched from their yard at Pallion, the steamer *Hermion*, built to the order of Messrs. Brunsgaard, Kiösternd and Co., Drammen. The dimensions of the vessels are :—Length 402 ft., breadth 54 ft., moulded depth 27½ ft. The deadweight capacity is 8,600 tons. During construction the vessel has been superintended by Messrs. Bushell, Nicol and Co., Newcastle, and Captain Steinert. Classification is with the British Corporation and Norwegian Veritas Societies. The engines and boilers are being supplied by Messrs. Doxford.

LAUNCHES—Scotch.

Jan Van Nassau.—There was launched from the shipbuilding yard of Messrs. William Hamilton & Company, Ltd., Port Glasgow, a handsomely modelled steel screw passenger and cargo steamer built to the order of the Royal Dutch West Indian Mail Co., of Amsterdam. The principal dimensions are :—Length, 361 ft.; beam, 44 ft.; depth to awning deck, 28 ft. 5 in. The vessel, which is intended for the West Indian trade, is rigged as a fore and aft schooner and has twin masts. Accommodation is provided in houses on the awning deck for engineers and passengers; handsome saloon, smoking room, etc., etc., the captain's and officers' accommodation being on the bridge deck; charthouse and wheelhouse being on flying bridge overhead. The after 'tween deck is arranged for emigrants. Special attention has been given to the ventilation of the vessel. The vessel is provided with eight large winches, twelve large derricks, and one extra heavy derrick for special lifts. Electric light throughout; teak decks, and a large ice house and cooling chambers. Machinery will be supplied by Messrs. David Rowan & Co., of Glasgow, and consists of triple-expansion engines, having cylinders 25 in., 41½ in. and 68 in. by 51 in. stroke; three single-ended boilers 15 ft. dia. by 11 ft. 6 in. long, of 180 lbs. working pressure; and fitted with forced draught. This vessel has been built on the Isherwood system of longitudinal framing to Lloyd's highest class, special survey, and under the superintendence of Mr. W. Fenenga, of Amsterdam, and of Captain Van der Borden, while the machinery department has been under the supervision of Mr. Meyer.

Ardgair.—Messrs. Robert Duncan & Co., Port Glasgow, launched recently the steamer *Ardgair,* which they have built for Messrs. Lang & Fulton, Greenock. The vessel, which is 405 ft. in length, 53 ft. in breadth, and 29 ft. 9 in. in depth, has a deadweight carrying capacity of 8,300 tons. Messrs. J. G. Kincaid & Co., Greenock, will supply the vessel with triple-expansion engines.

Poonbar.—On March 20th, there was launched from the yard of Messrs. Murdock & Murray, Ltd., Port Glasgow, a steel twin screw steamer for the North Coast Steam Navigation Co., Sydney, N.S.W. The vessel is of the quarter deck type with topgallant forecastle, and will carry a large deadweight on a light draft. The order for the vessel was placed by Messrs. Hendry, McCallum & Co., Glasgow, and during construction both hull and machinery have been built under their supervision. The vessel is classed in the British Corporation and has also a Board of Trade certificate. After the launch the vessel was towed to Glasgow where the machinery will be fitted on board by Messrs. Lidgerwood, Speedwell Iron Works, Coatbridge.

Alsatian & Andania.—On March 22nd, two large vessels were launched on the Clyde for service between Great Britain and Canada. At Dalmuir Messrs. William Beardmore & Co. launched for the Allan Line the quadruple-screw turbine steamer *Alsatian,* of 18,000 tons gross, 20,000 s.h.p., and 18 knots speed; and at Greenock Scotts' Shipbuilding and Engineering Company launched for the Cunard Company the twin-screw, reciprocating-engined, 13,000-ton steamer *Andania.* The *Alsatian* is a sister ship to the *Calgarian,* which is to be launched by the Fairfield Shipbuilding and Engineering Co., Govan, about a month hence; and the *Andania* is a sister ship to the *Alaunia,* which Scotts' Company have at an advanced stage on the stocks. The two Allan Line vessels are intended for their owners' service between Liverpool, Quebec, and Montreal, and the twin Cunard steamers are also for the Canadian service, but from London and Southampton to Quebec and Montreal. Messrs. Wailes, Dove & Co.'s "Bitumastic" enamels, coverings, solutions, etc., have been used in these vessels.

St. Serf.—On March 24th, Messrs. Hawthorns & Co., Limited, Leith, launched from their Junction Bridge Yard, a finely modelled steel screw steam yacht. The yacht has been built to the order of Mr. Alfred H. Brown, naval architect, 25, Ryder Street, London, S.W., and to his design and superintendence. This is the second yacht that Messrs. Hawthorns have built for the same owner. The following are the dimensions: Length on waterline, 160 ft.; breadth moulded, 25 ft; depth moulded, 16 ft. 3 in. The vessel will be fitted with triple expansion machinery by the builders, for a working pressure of 205 lbs. per square inch, and has all the latest appliances, such as steam steering gear, steam windlass, steam capstan, electric light, etc. A Cochran Annan donkey boiler fitted with patent seamless furnace has been supplied and fitted.

Saaid.—On March 25th, there was launched at Paisley a vessel named *Saaid,* which is registered at Koweid, Persian Gulf. The craft, which is built for foreign owners, is 132 ft. long, and is to be used as a fresh-water carrier. She has a capacity of 300 tons, in two tanks.

Hawkhill.—On March 26th, there was launched at Port Glasgow the steamer *Hawkhill,* which has been built to the order of Messrs. Crawford & Rowat, Glasgow. Her dimensions are: Length, 285 ft.; beam, 49 ft. 8 in.; and depth, 28 ft. 6½ in. She has a gross tonnage of 4,500, and is constructed to the highest class at Lloyd's for the general carrying trade.

South Bulli.—On April 3rd, Messrs. Hall, Russell and Company, Aberdeen, launched the first of two steamers which they are building for the Bellambi Coal Company, Sydney, New South Wales. The vessel, which has been constructed to Lloyd's highest class, is of the following dimensions: Length, 200 ft.; breadth, 30 ft.; and depth, 18 ft. 3 in. She has been built specially for the coal-carrying trade. Steel boilers and triple-expansion engines will be supplied by the builders. The construction of the vessel has been under the supervision of Mr. Robert E. Thomson, superintendent engineer to Messrs. M'Ilwraith, M'Eachern & Co., London.

Phidias.—On April 3rd, Messrs. Archd. McMillan and Son, Ltd., Dumbarton, launched the steamer *Phidias,* the second of two vessels, which they have built for Messrs. Lamport & Holt, Ltd., Liverpool. The dimensions of the vessel are: Length between perpendiculars, 415 ft.; breadth extreme, 56 ft.; depth moulded, 30 ft. 9 in. The machinery is being supplied by Messrs. David Rowan and Company, Glasgow.

Ussa.—On April 4th, the Clyde Shipbuilding & Engineering Co., Ltd., Port Glasgow, launched a steel screw steamer, 304 ft. by 44 ft. 6 in. by 29 ft. 6 in. to shelter deck, for Stott Baltic Steamers, Ltd., Liverpool. The vessel was named *Ussa,* and immediately after the launch was placed in the company's dock to receive her machinery, which has also been constructed by the builders. The vessel and her machinery are being constructed throughout under British Corporation Survey, for their highest class.

Innisshannon & Innisfree.—On April 7th, Messrs. Wm. Chalmers & Co., Rutherglen, launched the oil-engined coasting vessel *Innisshannon,* which they have built for the Coasting Motor Shipping Co., Glasgow. The vessel is 115 ft. in length, 21 ft. 6 in. in breadth, 10 ft. 6 in. in depth, and of 375 tons gross. She is the largest ship of the fleet which has been launched so far for the Coasting Motor Co. Some new features are embodied in the design, the most important being the situation of the navigating bridge on the forecastle deck instead of aft. The engine, which is of 230 b.h.p., will be supplied by Messrs. Wm. Beardmore & Co., Dalmuir. The *Innisshannon* will be the ninth vessel of the fleet to enter the owners' service. The eight ships which are already employed in the coasting trade include five of 140 tons and three of 230 tons. On April 8th, the 140-ton *Innisfree* was launched by Messrs. P. McGregor & Co., Kirkintilloch. The vessels of the fleet which remain to be launched include four of 170 tons each, one of 375 tons—a sister ship to the *Innisshannon*—and two of 400 tons each. Messrs. Chalmers & Co. are building the three larger vessels. These boats are all classed with the British Corporation.

St. Margaret.—On April 8th, Messrs. Ramage & Ferguson, Leith, launched a steamer 215 ft. in length, 31 ft. in breadth, and 16 ft. 2 in. in moulded depth, which they have built for the Leith and Orkney service of the North of Scotland and Orkney and Shetland Steam Navigation Company. The vessel has fine accommodation for a large number of passengers, and she will carry about 350 tons of cargo. A Cochran Annan donkey boiler fitted with patent seamless furnace has been supplied and fitted.

Charles Harrison.—On April 8th, Messrs. William Simons & Co., Ltd., of Renfrew, launched with all machinery on board and with steam up ready for work the barge-loading bucket dredger *Charles Harrison,* built by them to the order of the North Eastern Railway Company. The vessel, which has been specially designed for dock work, is of the bow-well bucket ladder type, and is well equipped for dealing with all classes of material, and is capable of dredging to a depth of 35 feet below water level. A set of compound marine type engines supplied by steam from a multitubular steel boiler constructed for a working pressure of 120lbs. drives the dredging machinery. The deck machinery includes steam gear for raising and lowering the bucket ladder; powerful bow and stern winches for manoeuvring purposes and for regulating the cut of dredger while at work. Comfortable cabins are provided for the officers and crew. The dredger is built to Lloyd's Survey, and was constructed under the direction of Mr. Charles Watson, engineer to the North Eastern Railway Company, Newcastle-on-Tyne.

Lighter.—On April 11th, Messrs. Fleming & Ferguson, Paisley, launched the second of the 1000-ton barges which they are building to the order of the Crown Agents for the Colonies. The vessel is intended for reclamation work at the port of Lagos, West Africa.

Kyno.—On April 13th, Messrs. Dunlop, Bremner & Co., Port Glasgow, launched a single screw steamer *Kyno,* which they have built for the Wilson Line's general cargo trade. The vessel is 310 ft. in length, 44 ft. 6 in. in breadth, 29 ft. 3 in. in depth, and of about 2,100 tons gross. She will be supplied by the builders with triple expansion engines, having cylinders 22½ in., 38 in., and 62 in. in diameter respectively, and a stroke of 42 in., supplied by steam from two large single-ended boilers. Classification is with the British Corporation Registry.

Paris.—On April 17th, Messrs. William Denny and Brothers, Dumbarton, launched the steamer *Paris,* which they have built for the English Channel service of the London, Brighton, and South Coast Railway. The new vessel, which will develop a high rate of speed, has several noteworthy features both in hull and machinery. In form she approaches to the design of a torpedo boat destroyer, having a warship stern. Her principal dimensions are: Length between perpendiculars, 300 ft. 6 in.; breadth moulded, 35 ft. 6 in.; and depth moulded, 23 ft. 3 in. The features of the machinery are the application of Parsons mechanical gearing to the turbines and the installation of water-tube boilers. The machinery will consist of two independent sets of Parsons compound steam turbines, each set driving a single shaft through gearing.

Bayano.—On April 19th, there was launched from the shipbuilding yard of Messrs. Alex. Stephen & Sons, Ltd., the twin screw steamer *Bayano,* the latest addition to Messrs. Elders & Fyffes' fleet of banana and passenger steamers. Her dimensions are 417 ft. by 53 ft. by 32 ft. 6 in., with a gross tonnage of about 6,000. The principal feature of the *Bayano* is the great insulated hold storage of 250,000 cubic feet for the conveyance of fruit at a low temperature, which is controlled by a powerful installation of air cooling machinery. Accommodation on a liberal scale is provided for 56 first-class passengers on the bridge deck in one and two berth staterooms, including special cabins and suites with private bathrooms and lavatories adjoining. The public rooms consist of large entrance hall, music room, dining saloon, smoking room and verandah cafe. Wireless telegraphy, also submarine signalling apparatus is fitted, and ample lifeboat accommodation will be provided for every person on board. The machinery is also supplied by the builders The vessel is built to the highest class of the British Corporation Registry. The *Bayano* when completed will take up her station in the service between Bristol and the West Indies and Central America.

Penelope.—On April 19th, Messrs. Lobnitz & Co., Ltd., Renfrew, launched for the Suez Canal Company a dredger named *Penelope.* The vessel, which is the largest bucket dredger afloat, is 309 ft. in length on deck, 47 ft. in breadth, and 20 ft. 2 in. in depth. She is classed with the Bureau Veritas, and has been inspected during construction by Mr. Marcel Roche, of the Suez Canal Company. The dredging machinery is of the most improved type, having independent dredging engine direct geared to the top tumbler. The twin-screw propelling machinery is independent, and all the gearing has machine-cut teeth. The bucket ladder is fitted with Lobnitz's patent elastic suspension to facilitate dredging hard ground in a seaway, the vessel being intended to work at the entrance to the Suez Canal.

Calgarian.—On April 19th, The Fairfield Shipbuilding and Engineering Co. launched on the Clyde the Allan Line mail steamer *Calgarian.* The vessel is a sister ship to the *Alsatian,* launched just a month ago, and when these two vessels are ready for their owners' fast Canadian service they will, it is claimed, be the largest and most magnificently appointed liners in the Canadian trade. The *Calgarian* is 590 ft. long, 70 ft. in breadth, and 54 ft 6 in. deep to her D deck, and has a gross tonnage of 18,500. Safety at sea has been a paramount consideration in the design of the *Calgarian.* Numerous transverse and longitudinal bulkheads are fitted, together with watertight decks, and a cellular double-bottom extending right fore and aft, and carried to an exceptional height up the sides. The ship would be quite safe with any four adjacent compartments open to the sea. Special strengthenings have been added forward as a protection against ice, and throughout the scantlings are materially in excess of Board of Trade and classification requirements. In the matter of boats and life-saving appliances generally, ample provision is made for every soul on board. The propelling machinery consists of compound steam turbines arranged in series on four shafts. By thus distributing the power vibration is reduced to a minimum, the four propellers being comparatively small in size, though capable of driving the ship at nearly 20 knots an hour, and maintaining a sea speed of 18 knots. The classification is with the British Corporation.

LAUNCHES—Irish.

Tenadores.—On March 28th, shortly after noon, Messrs. Workman, Clark & Co., Ltd., Belfast, launched from their North Yard a twin screw steamer, designed and built for general fruit carrying and passenger service between New York and West Indian ports. The *Tenadores,* a sister vessel to the *Pastores,* which left this port early in January, is 486 ft. in length, with a gross tonnage of about 8,000 tons, and has been constructed in accordance with the requirements of the British Corporation Registry of Shipping, the British Board of Trade, and the United States Steamship Inspection Service. The special feature of the vessel is the accommodation for 150 first-class passengers. The staterooms are roomy apartments, arranged for one and two persons, and replete with every requirement for the passengers comfort. A number of these rooms are arranged and provided with adjoining lavatories suitable for use as family suites; there are also several special cabins luxuriously furnished and decorated and having separate lavatories. The public rooms include the dining saloon, extending the full width of the vessel, a music room opening off the entrance hall, and a comfortable smokeroom. All these rooms are furnished and decorated in artistic and tasteful manner, and are efficiently ventilated by means of fresh air ducts and electrically driven fans, while an extensive system of steam heating is also provided. The cargo space of the vessel is divided into nine compartments, specially insulated and fitted up for the carriage of fruit in bulk, and the preservation of this cargo is ensured by the installation of an efficient plant of refrigerating machinery and fans for the supply of cooled fresh air which is delivered through ducts to each compartment. The propelling machinery consists of two independent sets of quadruple expansion engines of approved design, supplied with steam from three double-ended and one single-ended steel cylindrical multitubular boilers working under forced draught.

Caisson.—On April 10th, at noon, Messrs. Workman, Clark & Co., Ltd., Belfast, launched from their North Yard the second of two floating Caissons designed and constructed by them for the British Admiralty. The Caisson is intended for use in the large dry dock at present being constructed at Portsmouth Dockyard.

Katoomba.—On April 10th, Messrs. Harland & Wolff, Limited, Belfast, launched the triple screw steamer *Katoomba,* built to the order of Messrs. McIlwraith, McEachern & Co., Proprietary, Ltd., of London and Melbourne. The *Katoomba* is 466 ft. 1 in. long by 60 ft. 4½ in. beam, and over 9,000 tons gross. She will have accommodation for a large number of first, second, and third-class passengers, in addition to having large capacity for cargo, horses and cattle, also large refrigerated cargo space. The passenger accommodation will be of a superior type, a special feature being the size and luxurious furnishings and decoration of the public rooms and staterooms. The vessel will also have every facility for the rapid loading and discharge of cargo. For propelling machinery the owners have adopted the builders' latest combination of reciprocating engines driving the two wing propellers and the low-pressure turbine driving the centre one. The ship will, of course, be lighted throughout with electric light, and will embody the latest improvements in design and construction. The *Katoomba,* like the *Karoola,* built by Harland & Wolff, Ltd., for the same Company a few years since, will trade between Sydney, via ports, and Western Australia, and the employment of such a fine steamer in that service is an indication of the important developments in the trade and intercourse of the Australian Colonies. The vessel and her machinery during construction have been supervised by Mr. R. E. Thomson, of Melbourne, the owners' superintendent engineer. The *Katoomba* has been built under the survey of the Board of Trade for passenger certificate, also to the highest class of Lloyd's Register, and her lines were much admired by nautical experts, who consider her one of the finest models ever turned out by the eminent builders, Harland & Wolff, Limited.

Ayre Ballard Steamer.—On April 19th, the first steamer built by the North of Ireland Shipbuilding Co., Londonderry, was successfully launched in the presence of large and enthusiastic crowds. The city of Londonderry has had a long

and honourable connection with shipbuilding. As far back as 1842 it had established a record in turning out clipper-built ships, but that year it had the honour of launching the largest and newest type of vessel. This was the *Great Northern*, in which archimedian screws—propellers on either side of the rudder—were introduced. With the introduction of iron-built vessels Londonderry's trade gradually died out. In the eighties an attempt was made to revive the industry, but the effort did not last long. Twelve years ago a company was again formed, but came to grief. The new company has started out under the most hopeful prospects. In August last they took over a yard which was practically derelict, and they are to be congratulated on the fact that their first steamer has been launched at a comparatively early date, and that the other vessels are in a more or less forward state. It was, of course, considered desirable to restrict the first two steamers to moderate dimensions, but it is interesting to learn that those following are considerably larger vessels, the third being a vessel of about 8,000 tons. With the view of saving both time and expense the company are bringing to Londonderry the machinery of the vessels they build, to be placed on board and fitted there, rather than allow the hulls to be towed to the engine-builders' port—a proceeding not unattended with danger, and which, as a matter of fact, caused the downfall of the last company twelve years ago. The steamer, which is classed with the British Corporation, is intended for the Canadian Lake trade. She is of a peculiar form, being constructed on the Ayre Ballard arch principle. The leading dimensions are—Length, 250 ft.; breadth, 42·6 ft.; depth, 20 ft. The boilers and engines have been constructed by Messrs. Richardsons, Westgarth & Co., Ltd., at their Middlesbrough works, and are now on their way to Londonderry.

TRIAL TRIPS.

Clan Mactavish.—Recently, the new Tyne-built steamer *Clan Mactavish,* which has been constructed to the order of Messrs. Cayzer, Irvine & Co., Ltd., Glasgow, has been out for her trial trip, during which she maintained a speed of 14¼ knots. The vessel afterwards sailed for Australia, via Barrow and Glasgow. The principal dimensions of the vessel are: Length, 465 ft.; breadth, 57 ft.; and depth moulded, 37 ft. 1 in., and she has a deadweight carrying capacity of 8,850 tons. Nos. 1 and 4 lower holds and 'tween decks are suitably insulated and arranged for carrying frozen meat, fruit, or produce. The propelling machinery is of the triple-expansion type, having cylinders 31½, 52, and 86 in. in diameter, by 60 in. stroke, steam being supplied by four boilers. Classed British Corporation.

Ozarda.—On April 18th, the handsome steel screw steamer *Ozarda,* built by Messrs. Wm. Gray & Co., Ltd., for Messrs. The British India Steam Navigation Co., Ltd., of London, was taken for her trial trip. The vessel has been built to the highest class in Lloyd's Register, and is of the following dimensions, *viz.*: Length over all, 392 ft.; breadth, 51 ft. 6 in.; and depth, 30 ft. She is a handsomely modelled vessel, with two decks laid, and poop, long bridge and topgallant forecastle, and has very tasteful cabin accommodation in houses on the bridge deck for passengers, captain and officers, and the crew is berthed in the forecastle. An electric light installation is fitted throughout. A cellular double bottom and after peak tank, together with deep tank or hold compartment, are fitted for water ballast abaft the engine room, giving a total capacity for water ballast of about 2,000 tons. The whole of the outfit, including sanitary tanks, fresh water distiller, steam windlass, steam steering gear, two derricks to lift 30 tons each, 12 steam winches with return exhaust to winch condenser, are of the most approved description. The machinery has been made at the Central Engine Marine Works of the builders, and is of the triple expansion type, having cylinders 28 in., 46 in., and 77 in. diameter, with a piston stroke of 48 in., and three large steel boilers of the builders well known flanged shell type, adapted for a working pressure of 180 lbs. per square inch, and worked under Howden's system of forced draught. The engines are fitted with "Contraflo" main and auxiliary condensers, and a pair of Weir's pumps and heater, which, in conjunction with a special arrangement of boiler feed heating by means of the exhaust steam, insure a high feed temperature. The engine room auxiliaries are very complete, and include a number of duplex pumps and evaporator of the builders' "Cmew" type.

Trusty.—On April 18th, the twin-screw tug *Trusty,* built by Messrs. John Cran & Co., Leith, went on her official trials and speed runs on the measured mile in Aberlady Bay. She averaged approximately 11¾ knots to the series of runs. Her manœuvring abilities were tested, and found very satisfactory. She has been built to the order of the Swansea Harbour Board under the superintendence of Messrs. James Pollock, Sons & Co., Ltd. The vessel is also equipped for salvage purposes, and with fire extinguishing plant.

Clan Mackellar.—An important addition has just been made to the fleet of The Clan Line of Glasgow (Messrs. Cayzer, Irvine & Co., Ltd., managers), in the fine steel screw steamer *Clan Mackellor,* which left the Tyne early in March to undergo her official trial trip. The vessel is 425 ft. in length, and 52 ft. beam, with three complete steel decks, including the shelter deck all fore and aft, with a cargo carrying capacity of over 8,750 tons. The vessel is constructed in the most up-to-date manner, viz.: On the deep bulb angle frame principle, has clear holds and is fittest with the latest improvements and appliances to make her in every way a first-class liner. A large quantity of water ballast is carried in the cellular double bottom deep tank and after peak. The shelter 'tween deck is of exceptional height, and is so arranged that a large number of emigrants, troops or horses, can be carried. The loading and discharging facilities are complete, the steamer having ten derricks and eleven winches to ensure the most expeditious handling of cargo. An electric light installation has been fitted throughout the vessel. She has been constructed to a fine model with a view to rapid speed and economy in fuel, and the machinery has been supplied by Earle's Shipbuilding & Engineering Co., Ltd., Hull, consisting of engines with cylinders 28 in., 46½ in., 78 in., by 54 in., three boilers 15 ft. 3 in. by 12 ft., 200 lbs. pressure, constructed to the requirements of the Hamburg Baupolizei, and fitted with Howden's forced draught. The trial trip proved satisfactory, and a speed of 13 knots was obtained.

St. Chamond.—On March 20th, the above-named steamer, built by Messrs. Wm. Gray & Co., Ltd., West Hartlepool, for Messrs. Les Chargeurs de l' Ouest, Societe Anonyme de Navigation, of Nantes, after taking in cargo in the Tyne, was taken for her trial trip prior to her proceeding to her destination. The owners were represented by their chief inspector, Mr. A. Martail, under whose superintendence the ship and machinery have been built, and Mr. J. Hartness was present on behalf of the Bureau Veritas Registry. The weather conditions were unfavourable, but a very satisfactory trial was made, the vessel afterwards proceeding on her voyage. For Launch, see March issue.

Rounton Grange.—On March 20th, the steel screw steamer *Rounton Grange,* built by Messrs. The Northumberland Shipbuilding Co., Ltd., Howdon-on-Tyne, to the order of Messrs. Furness, Withy & Co., Ltd., West Hartlepool, for the Houlder Line, Ltd., London, of which Messrs. Houlder Bros. & Co., Ltd., are the managers, left the Tyne for her official trial trip. The vessel is 400 ft. long, 52 ft. beam, by 29 ft. 6 in. deep, of the single deck type, and has been built under special survey to the highest class at British Corporation. She is fitted with long bridge, poop, and topgallant forecastle. Accommodation in steel houses on bridge deck. There are ten steam winches, by Messrs. Clarke, Chapman & Co., Ltd. A large number of cargo derricks, and steam windlass by Messrs. Emerson, Walker & Thompson Bros., Ltd. The usual water ballast arrangement for light passages are fitted. The machinery has been supplied by Messrs. Richardsons, Westgarth & Co., Ltd., Sunderland, consisting of engines with cylinders 25 in., 40 in., 68 in., by 48 in. stroke, three large boilers with 180 lbs. pressure. The vessel carries over 8,000 tons on a light draft. During construction the vessel has been superintended by Mr. D. Roco, of Messrs. Furness, Withy & Co., and Mr. Flowers of the Houlder Line. The trial trip proved in every way satisfactory, and a speed of 11½ knots was obtained.

Iossifoglu.—On March 22nd, the first-class finely modelled cargo steamer *Iossifoglu,* built by Messrs. Robert Thompson & Sons, Ltd., at their Southwick Yard, to the order of Mr. S. Iossifoglu, of Athens, Greece, proceeded

to sea for her official trial. The trial trip was very successful, the engines running with perfect smoothness, easily attaining a mean speed of about 11¾ knots, and Mr. S. Iossifoglu, who was on board, expressed entire satisfaction with both vessel and machinery. For Launch, see April issue.

Dilston.—On March 27th, the steel screw steamer *Dilston,* recently launched by the Blyth Shipbuilding & Dry Docks Company, Ltd., was taken to sea for trial. The performance of ship and machinery during the trials gave every satisfaction to all concerned. During construction the *Dilston* has been under the supervision of Messrs. Jos. R. Scott & Son, of Newcastle-on-Tyne. For Launch, see April issue.

Pascal.—On April 1st, the new steamer *Pascal,* built by Messrs. Archd. McMillan & Son, Ltd., Dumbarton, for Messrs. Lamport & Holt, Ltd., Liverpool, ran trials on the Firth of Clyde. The machinery was supplied by Messrs. David Rowan & Co., Glasgow. On the completion of the trials, which where in every way satisfactory, the vessel proceeded to Cardiff to load for the River Plate. For Launch, see April issue.

Neuquen.—The s.s. *Neuquen,* built by the Campbeltown Shipbuilding Co., Campbeltown, to the order of the Buenos Ayres Great Southern Railway Co. (Messrs. Arthur Holland & Co., London, managers), has just completed very satisfactory trials on the Clyde. The vessel has Lloyd's classification, is of the single deck type, with poop, bridge and forecastle, and has roomy accommodation for a number of first-class passengers in houses on the bridge deck. Her dimensions are: Length, 362 ft.; breadth, 50 ft.; depth moulded, 26 ft. The machinery has been supplied by Messrs. Rankin & Blackmore, Greenock, and consists of triple expansion engines, 24 in., 40 in., 65 in., by 45 in. stroke, supplied with steam from three large cylindrical boilers working at a pressure of 180 lbs. A very full specification of deck and engine room auxiliary machinery has also been supplied. Messrs. Wailes, Dove & Co.'s "Bitumastic" Solution and Covering have been applied to the lower permanent bunkers, engine and boiler room tanks and tank tops.

Kafue.—On April 5th, the large screw steamer *Kafue,* built by Palmers Shipbuilding & Iron Co., Ltd., to the order of the Bucknall Steamship Lines, Ltd., London, had a successful sea trial. The vessel, which is about 440 ft. long, is designed for carrying general cargo, her deadweight capacity being about 10,000 tons. She is classed 100 A1 under Lloyd's special survey, having two complete decks with long poop, bridge, and forecastle. Water-ballast is provided for in cellular double bottom, all fore and aft, also in deep tank. The vessel's machinery consists of triple-expansion engines 25½ in., 43½ in., and 76 in. by 51 in. stroke, steam being supplied by three large boilers having a working pressure of 220 lb. The trial was in every respect successful, the engines working very smoothly throughout.

Benheather.—On April 5th, the s.s. *Benheather,* built by Messrs. Wm. Pickersgill & Sons, Ltd., went on her trial trip, which was in every way satisfactory, after which she proceeded to Barry to load. The owner, Mr. Joseph Hoult, of Liverpool, was represented by Mr. Jos. Robinson. The vessel is 391 ft. long, 52 ft. 3 in. broad, and 29 ft. 6 in. deep, and takes British Corporation highest class. She is fitted out as an up-to-date cargo vessel of the single deck type, having five large cargo hatches and a complete equipment of derricks both on tables at the masts and on posts at the poop and bridge, along with ten steam winches for quick discharging. Her holds are fitted to comply with the Board of Trade Grain Cargoes' Act. The captain, officers and engineers are berthed in tastefully fitted accommodation on the bridge. The crew and petty officers have commodious quarters in the forecastle. The engineers (Messrs. Richardsons, Westgarth and Company, Ltd.) were represented by Mr. A. Harrison and Mr. Russell.

Ellin.—On April 7th, the s.s. *Ellin,* lately launched from the shipyard of Messrs. Short Bros., Ltd., at Pallion, Sunderland, left the Tyne for her official trials. She has been built on the Isherwood patent system, to the order of S. G. Embiricos, Esq., of Athens and Cardiff, her dimensions being: Length, 405 ft.; beam, 52 ft.; and depth moulded, 26 ft. 3½ in., and will carry a deadweight of 7,800 tons on a light draft. During construction the vessel and machinery have been under the personal supervision of Mr. Henry J. Richards, of Cardiff. The trials were very successful, the engines running to the satisfaction of all on board. For Launch, see March issue.

Trevilley.—On April 8th, the new screw steamer *Trevilley,* built by Messrs. John Readhead & Sons, Ltd., West Docks, South Shields, to the order of Messrs. Edward Rain & Son, St. Ives, Cornwall, was taken to sea on her official trial trip. The trial was in every way satisfactory to all concerned, and the vessel will load for Port Said under the command of Captain Edward Hain. For Launch, see April issue.

Devon City.—On April 9th, the s.s. *Devon City,* built by Messrs. Ropner & Sons, Ltd., of Stockton-on-Tees, made her official trial trip in the Tees Bay. The steamer has been built to the highest class in the British Corporation Registry, and is for Messrs. W. R. Smith & Sons, of Cardiff. She is about 403 ft. 6 in. long, and has a deadweight carrying capacity of about 8,000 tons. Her outfit is thoroughly up-to-date, and includes stockless anchors, quick warping windlass, steam steering gear amidships, and powerful hand screw gear aft, whilst she is particularly well equipped with derricks and winches of the most modern type in order to facilitate the loading and discharging of heavy cargoes. The accommodation for captain, officers and engineers is arranged in houses on shelter deck, crew in the forecastle. The engines are of the triple expansion type, by Messrs. Blair & Co., Ltd., of Stockton-on-Tees, of about 2,412 i.h.p., having two steel boilers 17 ft. 6 in. by 11 ft. 6 in., 180 lbs. pressure of steam. The vessel has been built under the superintendence of Captain J. H. R. Smith, and on her trial behaved in a thoroughly satisfactory manner. After some very satisfactory trial runs, during which the vessel attained a speed of over 11½ knots, she proceeded to Barry to load.

Norman Bridge.—On April 10th, the oil-tank steamer *Norman Bridge,* which has been built and engined at the Neptune Works of Messrs. Swan, Hunter & Wigham Richardson, Ltd., went for a very successful trial trip off the river Tyne. The vessel has been built on the Isherwood system of longitudinal framing, and is 365 ft. in length, and has been constructed to obtain the highest class in Lloyd's Register. She will carry 6,600 tons of oils, distributed over 16 tanks arranged in pairs, and in each tank has been installed a very complete system of steam heating, by means of which heavy oils may readily be dealt with. In every way she is an up-to-date and complete oil-tank steamer. The vessel has an installation of wireless telegraphy. The propelling machinery is fitted aft, and consists of a set of triple-expansion engines, supplied with steam from two boilers working under forced draught and arranged to burn oil fuel. Both engines and boilers have been built at the Neptune Works, and on the trial trip worked without the slightest hitch, giving satisfaction to all concerned, and propelling the vessel at a speed of 11½ knots per hour.

Toanui.—On April 11th, the steamer *Toanui,* built by Messrs. William Chalmers & Co., Rutherglen, and engined by Mr. James Ritchie, Partick, ran trials on the Clyde with satisfactory results. The machinery, which is of the compound surface-condensing type, worked smoothly throughout, and a speed of 10½ knots was maintained on the measured mile. The vessel, which is to be used for salvage purposes, is fitted with special centrifugal pumps. She is classed with the British Corporation Registry.

Nordmark.—On April 11th, the s.s. *Nordmark,* built and engined by Messrs. William Doxford & Sons, Ltd., Pallion, Sunderland, to the order of the Hamburg-Amerika Linie, Hamburg, ran a successful sea trial. The dimensions of the vessel are: Length, 434 ft.; breadth, 54 ft.; moulded depth, 29 ft.; deadweight capacity, 8,850 tons. The vessel is to Lloyd's 100 A1 classification, and during construction has been superintended on the owners' behalf by Mr. C. Hatje and Mr. Waak, who were present at the trial.

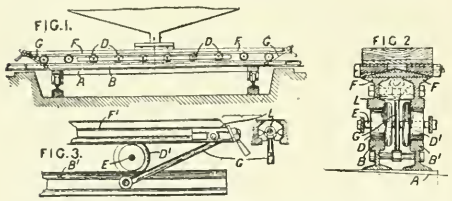
Buenaventura.—On April 16th, the steel screw steamer *Buenaventura,* built by Messrs. The Northumberland Shipbuilding Co., Ltd., Howdon-on-Tyne, to the order of Messrs. The Isthmian Steamship Co., Ltd., London, left

the Tyne to undergo her official trial. The vessel is about 420 feet long by 52 ft. 6 in. beam by 30 ft. deep, and has been built under special survey to Lloyd's highest class. She is fitted with long poop, long bridge and topgallant forecastle, with the holds free from obstruction owing to the girder system of construction being adopted. The accommodation, which is very ample, is placed in steel deck houses on the bridge deck. Very special attention has been paid to the loading and discharging gear, and a complete outfit for the rapid handling of cargo, consisting of ten steam winches by Messrs. Clarke, Chapman & Co., Ltd., Gateshead, and a large number of cargo derricks, steam windlass by Messrs. Emerson, Walker and Thompson Bros., steam steering gear by Messrs. John Hastie & Co., Greenock; complete installation of electric light by Messrs. Clarke, Chapman, Gateshead. She is fitted with the usual water ballast arrangements for light passages. The propelling machinery has been supplied by Messrs. The North Eastern Marine Eng. Co., Ltd., Wallsend, consisting of engines and cylinders 27, 44, 73 by 51 stroke, three large boilers working at 180 lbs. pressure; the boilers being fitted with Howden's forced draught arrangements. The vessel will carry about 8,200 tons deadweight on a light draft of 24 ft. 3 in., and will steam about 11 knots loaded at sea. During construction the vessel has been superintended by Messrs. John Crookston & Son, London, on behalf of the owners. The trial trip proved satisfactory, and a speed of 12 knots was obtained.

Abridgments of New Patents.

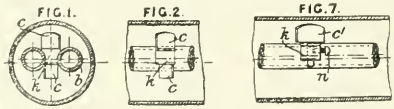
Compiled by Messrs. E. P. Alexander & Son, Chartered Patent Agents, 306, High Holborn, London, W.C.

28,437. Slipways for Ships. Relates to slipways of the type in which the main carriage A carries transverse rails B for transferring to a side stance an upper carriage on which the ship rests. The rails B, B^1 are connected together and upon them are rollers D, D^1, upon which in turn slide rails



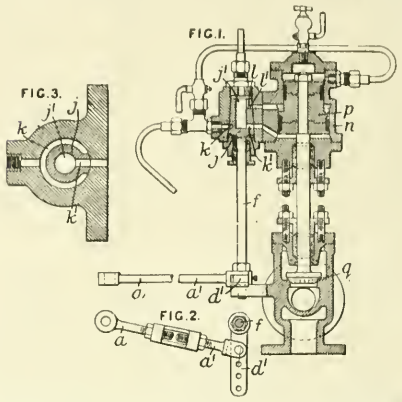
F, F^1 fastened to the upper carriage. The upper and lower transverse rails may be locked together by means of pivoted tie-rods G, the upper ends of which may be locked between the jaws of a device L. The axles E of adjacent rollers D are connected together as shown in Fig. 1.

28,607. Steam Superheaters. Superheater tubes inserted in boiler smoke-tubes are provided with detachable baffles in order to produce eddies in the hot gases passing through the smoke-tubes. Upper and lower baffle-plates, *c*, Figs. 1 and 2, inclined in opposite directions are secured to parallel super-



heater tubes *b* by a body portion *k*, which is jammed between the tubes. The baffles may be formed with stems adapted to be inserted in plates enclosing and supporting the superheater tubes. The baffle *c1*, Fig. 7, may be set at any angle in the body portion *k* by a set-screw *n*.

28,819. Steering Gear for Ships. The main stop-valve *q* is opened and closed by a fluid-actuated piston *p* controlled by a valve *j* which is operated by intermediate mechanism connected to the steering wheel. The valve *j* is formed with a groove *k* for admitting fluid beneath the differential piston *p*, and with a central exhaust chamber *j1* having branches *k1* and *l*, *l1* adapted respectively to register with the bottom



of the cylinder *n* and with the space around the shoulder of the piston. The rod *f* is turned, when the steering-wheel is moved, by means of a crank *d1* to which an adjustable connecting rod *a*, *a1* is attached as shown in Fig. 2.

TECHNICAL SOCIETIES.

North East Coast Inst. of Engineers and Shipbuilders, Newcastle-upon-Tyne.—April 25th was the last fixed meeting for the session 1912-1913. The result of the ballot for officers for session 1913-1914 was disclosed.

North-East Coast Inst. (Graduate Section).—All applications to compete in the Institution Scholarship examination, Sept., 1913, must be sent in not later than August 1st. The Secretary will be pleased to send any explanations required.

Inst. of Engineers and Shipbuilders in Scotland, Glasgow.—On April 22nd the election of office-bearers for the new session took place.

Inst. of Naval Architects, London.—An invitation to hold a summer meeting in Glasgow, June 24th to 27th, has been extended to the Institution by the President and Council of the Institution of Engineers and Shipbuilders in Scotland. Meetings for the reading of papers will be held in the Scottish Institution building and arrangements will be made to visit some of the principal works in Glasgow and vicinity.

Inst. of Marine Engineers, London.—On May 3rd the members of the Institute will pay a visit to the City of London Electric Lighting Co., Ltd., Bankside, Southwark, S.E., and on May 24th to the Metropolitan Water Boards new pumping station and reservoirs at Chingford. On June 21st Marconi's Wireless Telegraph Co.'s Chelmsford Works will be visited, and on July 19th the works of the General Electric Co. at Hammersmith.

Inst. of Mechanical Engineers.—A conversazione will be held in May, and the summer meeting will be held at Cambridge, beginning on 28th July and extending to August 1st.

Junior Inst. of Engineers.—An ordinary meeting is to be held on May 21st.

The Iron and Steel Institute.—The annual meeting takes place on May 1st at the Inst. of Mechanical Engineers, when a number of papers will be read, and the annual dinner will be held in the evening of the same day, at the Hotel Cecil (Grand Hall). Mr. Arthur Cooper, the President, will preside, and a number of distinguished noblemen and gentlemen will be present.

The Society of Engineers.—On May 5th, Mr. C. A. Battiscombe will read a paper on "Tidal waters as a source of power." On May 3rd a Bohemian Concert will be held in the Holborn Restaurant at 8 p.m.

Royal Society of Arts.—On May 7th, Mr. Axel Welin, A.I.N.A., will lecture on life-saving appliances.

The Marine Engineer

And Naval Architect.

LONDON, JUNE, 1913.

OPPORTUNITIES FOR COMMERCIAL ENTERPRISE.

A WEEK or so ago the announcement was made that owing to the enterprise of certain firms of British shipbuilders and engineers, a trading combination had been formed, and had successfully negotiated for the carrying out of contracts with the Portuguese Government for the building of war vessels. It is evident, on looking round, that there is a wide scope for further efforts in this direction in other parts of the world, even if of a somewhat different character, and it would be well that the matter should receive the early attention of our commercial community. As a case in point it may be stated that there is at present a great development of building activity in Russia, especially as regards hydrotechnical constructions. The Russian Admiralty has passed a bill to spend over 500 millions of roubles on naval construction. The Ministry of Trade and Industry has carried through the Legislature a grant of 200 millions of roubles, to be followed by a further one of 300 millions of roubles for the enlargement and equipment of several Russian ports, which works are to be completed in 10 years' time. On account of this grant, works to the value of 300 millions of roubles are already in progress at the port of St. Petersburg, and works to the value of 2 millions are in hand at Nicolaeff, while furtber works are shortly to be undertaken at Odessa, amounting to 5 millions; Rostoff-on-Don to 2½ millions; Astrachan to 15 millions for port erections and a ship canal, among other things. Further, grain elevators are to be erected at Odessa, Nicolaeff and Rostoff-on-Don, at a total cost of more than 10 millions of roubles. The Marine Ministry has been permitted to proceed with extensive works at Reval, which will consist in the construction of a large Naval Port, to take the place of the one which is to be abolished at Libau, which will cost over 150 millions of roubles, and comprises break-water, inner moles, quays, dry and floating docks and the mechanical equipment of the port.

The Ministry of Ways and Communications has been granted permission to undertake a series of large works connected with the sluicing of Russian rivers and the construction and equipment of interior river ports. It has been decided, further, as the Russian shipyards are overwhelmed with orders, to place orders abroad for at least six powerful ice breakers and a fleet of tugs, dredgers and other craft. The above summary only represents a fraction of the undertakings which the various Government Departments have in view during the next decade. In addition to Government undertakings, many of the larger towns have in hand extensive works in the shape of canalization, water supplies, refrigerators, warehouses, grain elevators, etc. It will be recognized that for the purposes of these undertakings, not only capital is required, but also the participation of foreign manufacturers, as, although the bulk of the work will naturally be done in Russia, it will be necessary to obtain large quantities of machinery and other accessories abroad. In fact, it will be safe to estimate that at least 20% of the money set aside for the purposes of the improvements outlined above will have to be spent abroad. Several German, French and Belgian firms have already transferred their activity to Russia and have established branches there in the shape of Russian Technical Bureaux.

Bearing in mind the enormous possibilities offered to foreign contractors, engineers, builders, manufacturers, etc., and the fact that Russia, with her restricted industrial resources is incapable of coping with the demand herself, and furthermore the circumstance already indicated, that German, French and Belgian capitalists, engineering and industrial firms are hastening to claim their share of the orders that are going, it is much to be regretted that British firms are displaying apathy and ignoring the excellent opportunity offered to them of materially extending their operations. It should be obvious that what can be done by France, Germany and Belgium can be attained by British enterprise too—if only the will is there! It must be admitted that considerable difficulty is usually experienced in obtaining reliable expert agents in Russia to represent British interests, and the initial cost and the running expenses of branches in Russia are very high. There are also difficulties connected with the adequate staffing of such branches, as British employees are confronted by the barriers of language and racial differences, which are not easily surmounted. These difficulties could, however, be easily overcome by the formation of a limited company on co-operative lines of non-competing firms, with offices in London and St. Petersburg, each firm paying a fixed annual sum towards the expenses of the undertaking, such as rent of offices, salaries, travelling expenses, advertising, etc. On receiving enquiries the Russian office would forward them to the office in London, where they would be translated and handed over to the respective firms for quotations, on receipt of which the price would be reduced to the Russian currency, freight and forwarding charges calculated and commission added to them, and the complete estimate transmitted to St. Petersburg for presentation to the proper quarter. At the end of the financial year the amount of commission would be divided among the participants in the undertaking in proportion to the amount of their annual subscriptions and orders booked for their account. The main advantage of such a scheme would be that the cost of running an undertaking of the kind suggested would be one-tenth of the cost of establishing separate branches in Russia. In addition, however, as the number of firms taking part would be very considerable, the amount of capital in the form, shall we say of subscriptions, would be large enough to admit of the employment of first-class men, expert engineers and specialists in the various departments. The St. Petersburg office could be headed by one or two highly placed Russian officials (on retired list) of good social standing, which is so very important in Russia where business with Government institutions is concerned. A further advantage of an organization of this kind would be that it would act as its own forwarding agent, custom house clearing office, etc., thereby effecting a great saving in the time otherwise expended in making

enquiries, and also in the expenses incurred. Anyone who has business dealings with Russia will recognise the importance of the advantage. The organization would further possess valuable advantages in the matter of procuring raw material required by its members.

TRIPLE-EXPANSION ENGINES versus TURBINES.

In our May issue we gave a synopsis of a paper on the comparative trial between triple-expansion engines and geared turbine in cargo steamers, read by Mr. C. Waldie Cairns before the members of the North-East Coast Institution of Engineers and Shipbuilders at Newcastle-on-Tyne, in which it was shown that there was an advantage of 15% to the credit of the geared turbine. At the next meeting a discussion took place which had many interesting features. It was pointed out by Mr. James Stewart that the saving of 15% corresponded closely with the results obtained in the *Vespasian* which was a vessel of similar size, and it was generally admitted that a reliable rotary engine of simple construction, like a turbine, was preferable to the reciprocating engine with its multiplicity of working parts, although it is clear that each system will, however, have its place to fill in the future as in the past. From the ship owners' point of view as to voyage results and internal economy, Mr. Russell Cairns expressed preference for the turbined ship. There were many reasons for this opinion. In the first place when the ship came to be surveyed the fewer working surfaces reduced the cost and shortened the survey. Then the consumption of stores was lower, as an example, 3½ gallons of oil per day was the usual amount for reciprocating engines of the size in question, whereas he had an assurance that the geared turbine of similar size would do well on one gallon per week. Above all, the turbine set was 40 tons less in weight, which means 40 tons more cargo. Taking the approximate figures given in the paper as 27 tons of coal per day for the geared turbine as against 32 tons for the reciprocating engine, for a far eastern out-and-home trip taking 175 days, of which 73 would be spent at sea and 101 in port, the total expenses of the turbine came out at £11,700 and her freight at £19,734 leaving a balance of gross profit of £8,034. The reciprocating engine ship would require extra bunkers and carry shorter cargoes, the expenses would amount to £11,905 and the freight would amount to £19,378 leaving a balance of £7,473. This shows a surplus in favour of the turbine of £561 for 174 days, which is equivalent to £1,202 per annum. A similar calculation for a voyage to the River Plate showed £1,260 per annum, and one to America showed £1,460 per annum advantage.

THE FLEETS OF THE MAIL LINES.

(From our own Correspondent.)

The "Kenilworth Castle."

For some forty-eight hours in the middle of May real anxiety was felt for the safety of a great Union Castle liner, presumably the *Kenilworth Castle*, owing to a strange report of a stranding and abandonment. The facts are briefly these. Under date 3.45 p.m. on the 13th May, Lloyd's agent at Dakar reported that a Union-Castle liner was said to "be ashore Cape Gatha Blanco." The Company knew nothing of the alleged accident, though all its ships are now fitted with wireless, and there is a French land station at Dakar. It seemed strange that a stranding could have taken place at Cape Blanco without the vessel to which the mishap had occurred reporting herself either to that station or to some neighbouring ship. The only explanation of silence under such circumstances was some presumed failure of the ship's installation owing to the crash of collision. Enquiries were, of course, anxiously made, for it was known that there were four vessels of the Union-Castle line in the neighbourhood of Cape Blanco at the moment. These were — the *Braemar Castle*, outward bound for Delagoa Bay, which had left Teneriffe on the 5th May; the *Cawdor Castle*, outward bound for Mauritius, having passed Ushant on the 5th May; the *Kenilworth Castle*, outward bound with the mails, having left Madeira on the 7th May; the *Dover Castle*, homeward bound for London, having left Capetown on 29th April. Then inquiries showed that the report of the stranding came from the master of the Hartlepool steamship *Astræa*, who stated that on the 10th May in hazy weather he had seen a schooner rigged steamship with two funnels stranded at Cape Gatha. She had apparently red funnels with black tops and her hull was slate colour. Her estimated tonnage was about 9,000 tons. There was no smoke coming from her funnels and no sign of life about the ship. This report was horribly disquieting, for it seemed strange indeed that passengers should have been landed on a desert coast, and that officers and crew should have left the stranded ship, and above all that no wireless report had been made. The rate for re-insurances went to 40 per cent. on the risk that none of the four steamers named should be wrecked, and indeed it might have gone even higher on such a circumstantial story, if it had not been that some smart person remarked that the situation and description of the derelict tallied quite as much with the wreck of the French cruiser *Jean Bart*—a wreck since 1907—as with a Union-Castle liner. For the warship has two funnels and two masts still standing. Her hull has become slate colour with exposure, whilst the yellow of her funnels has grown red with six years' rust. On the 14th May came news of the safety of three of the four steamers which might have been ashore, for the *Dover Castle* reported herself, and also gave news of the *Braemar Castle* as late as 2 a.m. on the 11th and of the *Cawdor Castle* as from 7 a.m. on the 12th May. It will be remembered that it was on the 10th that the wreck was sighted. Thus only the *Kenilworth Castle* seemed outstanding, and she was the vessel that had two funnels, though, of course, she is not of 9,000, but of 13,000 tons gross register. People hesitated to quite accept the *Jean Bart* theory, because it seemed so unlikely that some one on board the *Astræa* would not have remembered the position of this well-known object of the African seashore. On the afternoon of the 15th May, however, all doubts were satisfactorily put at rest by the news that the *Kenilworth Castle* had been spoken four hundred miles south of Gatha point by the s.s. *Buluwayo* on the very day that the *Astræa* had seen the abandoned wreck. Since then news has come to hand that through the s.s. *Norseman* the P. & O. liner *Ballarat* spoke the *Kenilworth Castle* on the 12th May. During the forty-eight hours of anxiety the Union-Castle offices were kept open for news; innumerable letters and telegrams were passing; relatives of passengers, officers and crew were in a state of anxiety; underwriters were re-insuring risks on the cargo at Lloyd's and the H.M. cruiser *Forte* was scouring the African coast to see if she could be of assistance. But there is one consolation. In the old days when a steamer left the islands for the Cape she was out of

touch with the world till the telegraph reported her as being at Table Bay, save perhaps for possible speakings made to homeward-bound vessels which passed close to her, and reported her when the speaking ship reached her port of destination. Wireless has changed all that. This experience has shown that within a couple of days, even on the long stretch, all doubts as to the safety of a liner can be effectually cleared up. The incident therefore is one which will tend to encourage the extension of the wireless systems of the world.

Imperial Marine Association of Tokyo.

Other good news has not been wanting. The turbine steamer *Umegaka Maru*, of the Imperial Marine Association of Tokyo which sank at Moji in September of last year through the inadvertent opening of a sea-cock—has been floated at last. The salvors have had great difficulties in their work, the wreck having gone over on to its beam ends and the coffer-dams, constructed for the purpose of righting and floating her, having been carried away more than once. The vessel, though not of much tonnage, as tonnage goes in these days, was a valuable ship, and her recovery will be welcomed by all concerned, though the cost of putting her to rights will necessarily be heavy after her long immersion.

Leith Steamship "Dunedin."

Then there was the stranding of the Leith steamship *Dunedin*, which at the end of April ran on to rocks near Holyhead and became, whilst severely damaged forward, fixed on a pinnacle rock. The neighbourhood is by no means of good omen for strandings. But the Liverpool Salvage Association acted with the utmost promptitude and success. By five o'clock on the morning after the accident the salvage steamer *Ranger* was alongside, and three days later she reported that the *Dunedin* was floated and safe in Holyhead harbour, whence she has, after being tightened, been taken to Liverpool docks.

Royden Liner "Indrabarah."

Another important stranding was that of the Royden liner *Indrabarah*, a twin-screw vessel of 7,395 tons gross register fitted with a refrigerating installation. About the 9th May she was driven ashore by heavy weather on the coast of New Zealand, when loading meat, and was reported to be "breaking up fast." The idea was thus conveyed that she was a total wreck, but later telegrams indicated that the first damage was by no means serious, as the crew remained on board, and that prompt salvage measures might save her. Subsequently, however, she showed signs of straining and the outlook became less favourable.

The Imperator

is, as the German Emperor characterizes it, "suffering from infantile complaints," which, though very annoying, are not dangerous to her existence. First of all, she got on to a sand-bank—an incident which is so common in the waters off the North Sea coasts of Germany, as hardly to merit notice in a less important vessel. Then there was an explosion in her machinery department. This was at first spoken of as a "boiler explosion." It, however, turns out to have been nothing worse than a small explosion of benzine, brought about by the carelessness of a workman who desired to fill his pipe lighter from the ship's store. Now it appears that, owing to the bad weather which prevailed in the earlier part of May, the work of finishing up details and of final adjustment has been hindered, with the result that the first sailing is to be postponed from the 24th May to the 11th June. It is, however, now stated as a counter advantage that the Emperor will arrange to be on board the vessel when she makes her special cruise on the three days between the 7th and 10th July. That nothing may be lacking for the safe handling of this big ship, and the two sister vessels which are to follow her, the Hamburg-American line has had a special steam tug constructed for berthing big liners at New York. This vessel, which is the most powerful craft of its kind in the port of New York, has been built by the Staten Island Shipbuilding Co. She is 118 ft. long and has engines of 1,100 i.h.p. Dredging, too, has been undertaken in order to facilitate the berthing of the leviathan.

The White Star Line,

at the end of the month of April, announced that it was about to improve the position of its officers as and from the 1st May. The benefits to be conferred are to be threefold. First of all, salaries are to be raised to as much as from £3 and £4 per mensem, in the case of certain ranks. Then annual holidays will be given. These will extend to three weeks—not counting the time devoted to training in the Royal Naval Reserve. Of the three weeks at least a fortnight will be continuous, unless exceptional circumstances render this impossible. Thirdly, the three-watch system will be adopted throughout the fleet, even in cases where the reform will involve the carriage of an additional officer, whilst the messing arrangements will be improved in all steamers, the food in the passenger vessels will be equal to that provided for the first-class passengers. Reforms of this kind are not likely to be confined to the officers of one fleet—others are bound to follow suit when the way is shown, and action of the big passenger lines must in time tend to improve the conditions of service even in the smaller tramp steamships.

Commencing on the 21st June the White Star Line will provide direct sailings for New York by its cargo vessels from the port of Manchester. The first departure is appointed to be taken by the 6,000-ton *Memphian*, built in 1908 by Messrs. Harland & Wolff, and the twin-screw liner *Cevic* will follow on the 12th July. The report of the Company for the year 1912 has now been issued. The profit on the year's working is over £886,000. Out of this sum £108,000 has been written off as a proportion of the loss occasioned by the sinking of the *Titanic*; about £420,000 is written off for depreciation, and £100,000 is carried to the strengthening of the insurance fund. Prior to making these entries a sum of £225,000 was paid as an interim dividend on the 31st March. 1912, £133,000 has been paid as interest and the balance to profit and loss is carried forward. Thus, whereas the year 1912 began with £140,000 carried forward, the sum of £245,000 is carried forward into 1913. Thus the position has been apparently strengthened by the year's working, though the nett results of 1912 have been by no means so good as those of 1911. Several reasons may be adduced for this. Working expenses have gone up—coal and labour are dearer and each new ship is more costly to run than the vessel which she replaces. Then there was the loss of the *Titanic*, which, besides the actual and direct losses involved, caused a dislocation of the Atlantic service and the deprivation to the Company of an instrument from which great earning power might well have been expected. Then, too, the *Olympic* was out of service for a good part of the year, and so, whilst interest and depreciation on her cost were accruing day by day, there were no earnings to put against these outgoings. It is announced that Mr. E. C. Grenfell, of the firm of Morgan, Grenfell & Co., will replace Mr. Bruce Ismay on the Board. The report, it may be noticed, is careful to point out that Mr. Ismay's regretted departure from the management takes place in pursuance of a resolve of which intimation was given to the Board in January 1912—some months before the *Titanic* went down. Though Mr. Ismay will still be willing to give the Board the benefit of his experience and advice, the firm of Ismay, Imrie & Co., so long identified with the White Star Line, will no longer be in a position to act as managers for it and it will be needful to decide on managers in its place when Mr. Ismay goes at the end of the current half-year.

One need not be surprised that the

Great Eastern Railway

finds that the popularity of its route to the Continent is increasing, for the steamships which it provides—especially on the Hook of Holland Line—are so comfortable and the railway connections are so well-managed, that travelling by the Hook is a pleasure. The Company has just issued a booklet—well illustrated and furnished with plans of the steamships and trains—in which descriptions of the various facilities which the Company affords are set out. The volume, besides giving details of the five services which branch out across the North Sea from Harwich, tells a good deal of the attractions of the various historical places on the other side, and is generally calculated to make the reader anxious to journey *via* Harwich, or, if that be impossible, at all events on the railway company's corridor trains to the East Coast resorts for which it so liberally caters.

The French Government.

In dealing with the claims of its nationals upon the Italians for damage and detention to their shipping in the

recent war the French Government seems to have a success, which was assuredly denied of the British Foreign office in its dealing with Russia under similar circumstances. A sum of £6,400 has been awarded by the Hague Court of Arbitration to the Compagnie Générale Transatlantique in respect of the illegal arrest and detention of their liner *Carthage* on her voyage from Marseilles to Tunis in January, 1912. When searched, an aeroplane was found on the vessel, as were parts of another, and these were held to be contraband of war. So the master was forbidden to use his wireless and was taken into an Italian port. When the suspected articles had been seized, the ship was allowed to proceed. The shipments in question had been made in view of an intended aviation meeting at Tunis. The Italians offered to restore the property if the French Government would guarantee that the machines should only be used at Tunis itself. This the French Government naturally declined to do. Why should they have bound themselves to see to this? Hence the arbitration. The sum awarded is divided as to £3,000 to the shipowners; as to £1,000 to the airman; and as to £2,400 to the passengers and cargo-owners of the steamer. Similarly, a sum of £160 is awarded in respect of the seizure of some twenty-nine Turkish passengers aboard the steamship *Manoubia* about the same date. The fact that these matters, which excited great interest in both countries concerned at the time, should have been referred to and amicably adjusted by the Hague Tribunal, is a great feather in the cap of those who are working for the adoption of the arbitration principle.

At the beginning of May, the steamship *Southfield* of Cardiff was boarded by the officers of the Greek warship off Haiffa and ordered to proceed to Crete. Britain has, therefore, an opportunity of seeing if her Foreign Office can be as successful and expeditious as was that of France now that the latter country has shown the way.

The Ice Patrol Ship—"Scotia."

On the 15th April the *Scotia*—the vessel which has been fitted out by the Board of Trade in conjunction with the principal transatlantic steamship companies, for the purpose of affording warnings of the situation of icebergs near or on the tracks—put into the port of St. John's, Newfoundland, in order to refit and to fill up her bunkers. The scientific staff which had accompanied her then had the opportunity of reporting their impressions of the ship herself and their hopes of what they themselves might be able to do after they had acquired some little knowledge of the conditions under which they had to work. These gentlemen and the Marconi operators who accompanied them united in unqualified condemnation of the ship, at all events for the purpose for which she is now employed. Their objections were five in number: (1) that she was too slow and not of sufficient horse-power to be effective in Atlantic waters, (2) that she is not capable of carrying an installation of wireless of sufficient power to enable her, when lying to the north of the tracks watching for the approach of ice to communicate with liners which happen to be passing on the southern leg of the lane route, (3) that she is defective for purposes of scientific research, because she rolls to such an extent as to prevent the instruments from recording as they should, (4) that her coal capacity is insufficient, as it is not enough to enable her to hold the seas for a prolonged cruise and that thus she might fail in an emergency to do what is expected of her, (5) that her engines are not strong enough to drive her through field ice and so she cannot warn vessels as she ought. Now the criticisms thus made are not altogether fair to the ship. She was never intended, for example, to get into wireless touch with liners on the southern leg of the track. The idea was that she should report to the land stations of the wireless system, and that the gist of her warnings, qualified and improved by the general reports available to the hydrographical departments, should be re-transmitted to the steamships on the tracks. For cruising again, speed is by no means requisite. High speed means high consumption and if the observing vessel had a high speed—and used it—she would find that her ability to keep the sea was much curtailed. Nor is it necessary for a ship on this duty to be able to force her way through field ice. She is to warn the land, as we have said, not to get in touch with individual ships. The remaining criticism applies to her rolling. All small vessels roll when hove to in a heavy sea and we fear that even if the *Scotia* were exchanged for a vessel from the Newfoundland sealing fleet, as these gentlemen suggest, it would still be found that the new vessel was not as steady as a big liner. That the patrol ship is not as great a success as was anticipated seems to us to be due to the fact that even a patrol ship cannot be in more places than one at once. She moves slowly and her observations, being those of but one ship, cannot add much to the knowledge which is picked up and distributed by the liners themselves as they ply the shuttle of commerce across the Atlantic. It will be remembered that the *Titanic* had plenty of warning of ice on that fatal Sunday. She was even apprised of the existence of the very danger on which she struck, and of the place in which it lay. The advantage of sending out such a ship as the *Scotia* was to allow a look-out for ice to be kept to the northward of the tracks, and thus to enable warnings of ice to be given before it actually invaded the lane routes. How far the *Scotia* can effect this object remains yet to be seen.

"TITANIC" ENGINEERS' MEMORIAL.

THE amounts to the credit of this fund are as follows.

Institute of Marine Engineers, London, up to May 23rd	£2,810	0	0
Southampton Committee (this fund is now closed). Amount collected ..... This fund will be augmented by a sum of £300 from the Institute of Marine Engineers.	1,682	0	0
Liverpool Committee (for the erection of a monument in Liverpool), up to May 23rd ..	5,300	0	0
Total	£9,792	0	0

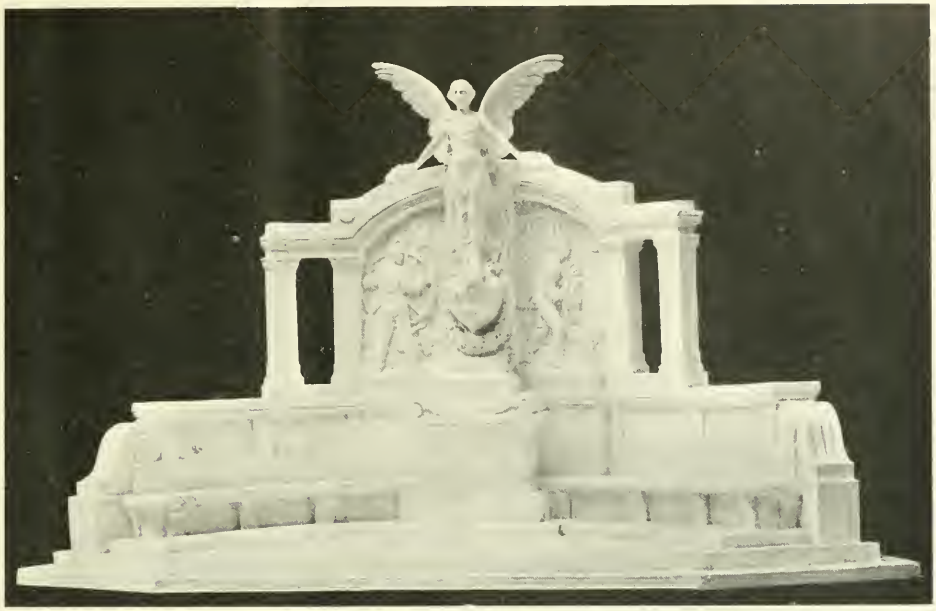
LIVERPOOL FUND.

In connection with the Liverpool fund, a meeting of the committee was held in Liverpool on 14th of May under the chairmanship of Mr. Arthur J. Maginnis, when it was reported that the City Council had unanimously allocated a site on the north side of the floating roadway a short distance from the bank of the river. As this is one of the most prominent sites in Liverpool, and is in full view of all callers to and from the ocean liners when at the landing stage, and also to all travellers by the ferries and the Overhead Railway, the committee gratefully accepted the offer of the Corporation, and decided to approach a well-known sculptor, who will be invited to submit a design for the memorial suitable to this spot. On receiving this the committee will decide upon further action. It is intended that this memorial shall not only perpetuate the heroism of the engine-room heroes on the *Titanic*, but similar acts of daring on the sea. The subscription list to date amounts to over £5,300, and it is expected that a further considerable sum will be forthcoming when the various collecting books out in all parts of the world have reached the treasurer's hands.

"TITANIC" ENGINEERS' MEMORIAL AT SOUTHAMPTON.

The design for the Southampton Memorial has now been decided upon and we are able to place before our readers a reproduction of a photograph taken from the model of the chosen design.

The selected design is circular in plan, with the centre forming an architectural treatment of a Roman altar, with a grouping in two panels on the frontal piece, the sculptor suggesting in two bas reliefs, groups of engineers, firm in courage and duty during moments of danger, sacrificing themselves to certain death for others. In front of the reliefs, and resting upon a boat prow (representing Navigation) rises a statue of Glory, with out-stretched arms, crowning with wreaths of laurel the martyrs of duty. Just below the boat prow will be placed the text, taken from St. John 15, verse 13, "Greater love hath no man than this, that a man lay down his life for his friends." Below the two bas reliefs, the names of the men and the centre panel, with the main commemoration inscription, is to be cut. The proposed approximate dimensions give a height of 19 feet, a length of 32 feet six inches, a breadth from the back outer line to the front of nine feet, while the



Titanic Engineers' Memorial—Southampton.
The above illustration shows the form of the monument to be erected at Southampton. It has been taken from a model of the selected design. (For description see text).

central figure will be seven feet high. The whole of the architectural portion of the work is to be executed in polished grey Aberdeen granite, the steps being in chiselled Aberdeen granite. The statue of Glory resting upon a boat prow, together with the bas reliefs and other ornamentation, will be worked in British bronze. The monument will cost £2,000, which has been gathered together as the result of International subscription. Large contributions have been received from Canada, America, the Argentine, South Africa, France, Belgium, besides the money received from English contributors.

A very careful selection by the Committee, assisted by Mr. Hamo Thornycroft, R.A., one of the leading sculptors of the day, from a number of models resulted in the design submitted by Mr. Joseph Whitehead, of Messrs. J. Whitehead and Sons, Ltd., Imperial Works, Kennington Oval, London, being chosen. This firm had the honour of executing the Queen Victoria Memorial outside Buckingham Palace and they have been entrusted with the preparation and erection of the *Titanic* Engineers' Memorial. Mr. Hamo Thornycroft has made certain valuable suggestions which will be embodied in the completed structure.

The memorial, which will be a great addition to Southampton's public architecture, will be completed by the end of the year, and the Committee have every reason to hope that Southampton will be proud of the monument, which will remind present and future generations of those heroes who met so sad, yet glorious, an end. It will also be some consolation to those nearest and dearest to the men who lost their lives in the engine room of the *Titanic* that their lost ones will never be forgotten.

CONGRESS OF REFRIGERATION. The third International Congress of Refrigeration will have its opening meeting in Washington, D.C., on September 15th. The other meetings, business and scientific will be held in Chicago, beginning September 17th. Mr. R. M. Leonard is acting as honorary secretary in England, and will be pleased to give information to any person who will write him. His address is 3, Oxford Court, Cannon Street, London, E.C.

NAVAL MATTERS—PAST AND PROSPECTIVE.

(*From our Own Correspondents.*)

Portsmouth Dockyard.

THE eagerly-awaited reply of the Admiralty to the demands for higher wages in the public dockyards was given by Dr. Macnamara in the House of Commons on May 8th. Briefly, the Parliamentary Secretary announced that increases amounting in the aggregate to £103,910 per annum had been sanctioned, to take effect from June 1st. Of this sum, £35,750 is for the shipwrights, £25,000 for the engineering trades, £19,000 for skilled labourers, and £14,000 for unskilled labourers, the remainder being absorbed by the joiners, plumbers and braziers, sailmakers, riggers, smiths, ropemakers, electrical station staffs and even hired messengers. These increases fall considerably below the men's expectations, and there is talk of keeping up the pressure upon the authorities which has been a feature of the last few months, and which includes a strike against all overtime. Dr. Macnamara's statement showed that the comparisons put forward of weekly rates of pay in the dockyards and in private firms were incomplete in themselves, for they took no account of the 48-hours' week, which is by no means universal outside; of the chance of establishment which is open to about one in every four of the skilled mechanics; and of the continuity of employment of non-established men, of whom 75 per cent. had a far surer chance of continuous work than the men in private firms. A wave of industrial prosperity might send up the weekly wages of the latter, but if aggregates were obtained of the earnings of a dockyard and a private shipwright during the last five years, Dr. Macnamara suggested that the wages of the dockyard worker would not fall much below those of a man outside. This is the official view, but of course the men, in a busy time like like the present, look at things differently. Despite the strike against overtime, new construction work is making good progress. The battleship *Queen Elizabeth* is almost

ready for launching, although it is not expected that she will go afloat until after the rush of work in the port connected with the summer manœuvres and the mobilizing of the crews of the vessels "in active commission" and "in reserve commission" to take part in these exercises. In addition, at the end of June the visit of the French President to England may be the occasion of a naval display at Spithead, if M. Poincare will cross to this port from Cherbourg, instead of from Calais to Dover, as his two predecessors did in 1908 and 1903. Good use has been made already of the new lock for docking big ships. The *Princess Royal* was passed out of it towards the end of April, when the *Monarch* took her place, and on the latter returning to her squadron at Portland early in May, the *Superb* was allotted to the new lock for her periodical overhaul. Meantime, the *Dreadnought* has been fitted with wider bilge keels in the floating dock. The battleship *Revenge*, for so many years tender to the Whale Island gunnery school, was paid off into the Material Reserve on May 14th on her place being taken by the more modern battleship *Albemarle*, which is to be officially styled a "gunnery training ship." The *Albemarle* will form a unit in the new Sixth Battle Squadron which the Admiralty is organizing from the training ships attached to the gunnery schools, in which squadron she will be associated with the *Vengeance*, *Duncan* and *Exmouth*. A sad accident on May 7th caused the death of Mr. John Williams, for seventeen years inspector of painters at Portsmouth dockyard, and formerly of Pembroke dockyard. Mr. Williams was knocked down by a railway engine alongside No. 3 dock and killed instantaneously. He was very popular among all classes in the yard, and widespread sympathy was shown at his untimely and sudden death.

Devonport Dockyard.

Failing to obtain as much consideration from the Admiralty in the matter of wages as they demand, the workmen show no signs at present of relinquishing their agitation or of rescinding the resolution against overtime passed on March 7th. The increases of 2s., 1s. 6d. and 1s. per week in the rates of the different classes, which were announced by Dr. Macnamara early in May, are not only less than those asked for, but less than what the majority of the workmen reasonably expected, and the men consider that too much has been heard lately of the advantages which come to them through being in State employment. The Admiralty refused to grant a percentage increase indiscriminately all round, and appear to have acted as fairly as possible in adjusting the £103,910 per annum to the different trades and grades. Probably they would have gone further had more money been available. The increases have yet to be felt, as they start from June 1st. It remains to be seen whether the present feeling of sullen disappointment will give place to one of gratitude for such concessions as have been made. The battleship *Centurion* is at last ready for service, and will be in commission by the time these lines appear. Her commissioning was rather inauspiciously preceded by a court-martial upon the officers concerned in the sinking of the steamship *Derna* with all hands last December, during the thirty hours' trial of the *Centurion*. The court acquitted Captain G. R. A. Gaunt, who commanded the battleship at the time of the collision, but reprimanded Lieutenant Hector Boyes, the officer of the watch. Two other armoured ships of the 1910-11 programme have arrived here for trials, the *Ajax*, from Greenock, and the *Queen Mary*, from Jarrow. The *Ajax*, since her arrival at the end of April, has carried out some of her trials with entire success, and her full-power trial is expected to furnish good results. As she is due to return to the Clyde by the beginning of June, it was thought possible that the *Ajax* might be ready for the manœuvres in July, but this seems unlikely. The *Queen Mary* came in from the Tyne on May 19th, a day or two after the *Ajax* had gone to Portsmouth for gunnery trials, and after being undocked she began progressive tests on May 31st. In view of the excellent records made by the *Lion* and *Princess Royal*, the *Queen Mary's* trials will be watched with interest. An addition to those useful vessels, the fleet repair ships, is to be made by the conversion of the steamship *Knight Companion*, which was recently purchased by the Admiralty. This ship will be renamed the *Reliance* (a name, by the way, first given to a British naval vessel in 1794), and the work of fitting her out as a repair ship is to be done at this yard. She is needed, as Mr. Churchill said in his speech on the supplementary estimates last July, for use in the Third Battle Squadron, as the *Cyclops* and *Assistance* are in the First and Second Squadrons, and just over a quarter of a million has been provided for her equipment in the current Navy Estimates. Several changes in the staff have just been made, first by the transfer of fifteen draughtsmen for temporary service at the Admiralty to cope with the large amount of work there in connection with the drawings of new ships to be built; and secondly, by the creation of eleven new posts in the dockyard with a view to relieving the supervising officials of some of the additional work which has lately devolved upon them. The new appointments include one senior foreman of the yard, two inspectors of shipwrights and two inspectors of engine-fitters, and new inspectors of ship-fitters, boilermakers and electricians. The effect of the change is to be the subject of a report to the Admiralty at the end of twelve months.

Chatham Dockyard.

Opinion on the increases of pay announced by Dr. Macnamara seems much divided, and while the shipwrights, who asked for an all-round rise of 4s. a week and have received 2s. for non-established and 1s. 6d. for established men, consider that they have cause for satisfaction, other classes, such as the smiths, who have been advanced to 38s. a week for non-established and 36s. for established men, consider that they deserved better treatment in view of the small proportion of their number who will benefit by the addition. Possibly more satisfaction may be felt when the changes are in actual operation. The result of the agitation, however, has been to add £103,910 to the annual wages vote for the dockyards, so that it has not been in vain from the labour standpoint. Taking previous concessions into consideration, a quarter of a million annually has been granted in the shape of increased pay in the dockyards since 1906. A clearance of the basins in the dockyard has been effected by the decision of the Admiralty to base a squadron of the Third Fleet on Pembroke. The *Goliath*, *Ocean* and other battleships of the "Canopus" type which have been berthed here for the past five or six years have been transferred to the Welsh port, setting free valuable space here. As these vessels belong to the Third Fleet and require the services of officers and men from the Reserves to complete their crews to full strength, there is no loss of time risked by their being sent to a port which has no manning depots or instructional establishments. The *Goliath* left here on April 25th and the *Ocean* on May 19th, while the *Jupiter* and *Albion* will follow to complete the division. The interest created by the launch of the *Lowestoft* is illustrated by the formation of a committee to arrange for a presentation to the cruiser by the time she is ready to commission, which according to the present anticipation should be in March next. As the *Nottingham* (at Pembroke Dockyard), the *Lowestoft* (at this dockyard), and the *Birmingham* (at Messrs. Armstrong's yard) are the last cruisers that will be named after cities apparently for some time, it may be hoped that each will receive a suitable memento of the association between the vessel and the city after which she is named. It must be seldom that three sister ships like these have been launched within three weeks. The *Nottingham* was put afloat on April 18th, the *Lowestoft* on April 23rd, and the *Birmingham* on May 7th. The construction of the *Arethusa*, which has now been seven months on the stocks, is proceeding steadily, but no date seems yet to have been fixed for her launch. Submarine *E*1 has been completed and sent to Portsmouth to join the Eighth Flotilla, in which there are already some boats of the "E" type serving, one of which, *E*4, was inspected by King George when visiting Portsmouth four months ago. As the first of the class to be completed at Chatham, however, *E*1 attracted unusual interest, and her successful trials must have been gratifying to those concerned in building her hull and machinery. The battleship *Queen* completed her refit on May 14th, and the cruiser *Hermes* and destroyer *Sparrowhawk* have been commissioned, the former for duty with the Naval Wing of the Royal Flying Corps.

Sheerness Dockyard.

The busy period which always occurs prior to the naval manœuvres will soon be with us, and is probably felt more here than anywhere. It is much to be hoped that before the mobilization of the nucleus crew ships actually takes place, and the numerous torpedo craft allotted to Sheerness for docking and stores have to be sent to sea, a settlement of the

labour question will have been arrived at. Although the Admiralty have made concessions in regard to wages, these have not given much satisfaction, and the "overtime strike" continues in force. Night shifts are being worked, but men employed on them are keeping to a 48-hour week. Torpedo boat *No.* 114, whose collision with *No.* 18 boat in the same flotilla was noted last month, was repaired and sent back to duty within eighteen days of the mishap by means of day and night shifts, this period including Sundays. Torpedo boats *Nos.* 18, 5 and 34 were also repaired and made seaworthy again in an expeditious manner. In connection with the docking and repair of torpedo craft, No. 4 floating dock, which was completed last year ostensibly for submarines at Dover, has been found useful at Sheerness for above-water torpedo boats. It has been in the Medway since delivery by Messrs. Swan, Hunter, Ltd., and there appears to be an idea that it will be retained permanently and a new dock sent to Dover. The sad accident by which Paymaster E. R. Berne, of the Naval Wing of the Royal Flying Corps, lost his life at Eastchurch on April 21st was universally deplored. He was a plucky and skilful airman, and deservedly popular. The fortitude he displayed after the mishap much impressed those who witnessed it, and it was ascertained at the inquest that his indomitable courage kept him alive for over an hour more than would otherwise have been the case. Paymaster Berne is only the second officer of the Naval Wing to lose his life, and it is remarkable that neither he nor the late Lieutenant Parke was killed whilst flying a naval machine.

Pembroke Dockyard.

With the *Nottingham* off the stocks, preparations for beginning a new light cruiser on the same slip are well forward, and it is expected that the first keel-plate will be laid shortly. This is the first of two light cruisers allotted to Pembroke in the current naval programme. From such information about her design as has leaked out, it appears that she will be 20 ft. longer than the "Arethusa" class, which have a length of 410 ft., while like them she will be protected by a 4-in. side armour belt. The displacement will be about 3,700 tons, and although the designed speed is said to be 29 knots it is probable that the vessel will be able to make well over 30 knots both on trial and on service under good conditions. It is reported that, like all the new destroyers, the new ship will burn oil fuel only. Besides the cruiser, we have also preparing to build another oil-fuel transport ship, 300 ft. long and to carry 2,000 tons of oil, to be called the *Turmoil*. The original ship of this type, the *Trefoil*, is making steady progress, as is the 500-ton oil-fuel lighter under construction on the same slip. These two oil ships are the only ones we have at the moment building, as none of the eight light cruisers in last year's programme were allotted to Pembroke Dockyard. The refit of the destroyer *Ness* has been completed, and she left on May 3rd for Chatham, her place being taken by the *Dove*,, which with the *Swale*, is now in hand. During the month the first ships of the squadron which is to have its headquarters at Pembroke have arrived, the first being the battleship *Goliath*, on April 30th, while the battleship *Ocean* followed on May 21st. The coming of the squadron will be welcomed here, for it will increase the importance of the yard somewhat, although the vessels are not in full or active commission. While the change makes a clearance in the larger yards whose basins and wharves were beginning to show signs of congestion, it does not affect the status of readiness for war of the ships, which depend for their crews partly on reservists who can only be called out by Royal Proclamation, and who can as easily be sent to Pembroke to embark as to Portsmouth or Chatham.

Mr. Angus Cameron.—Mr. Cameron, who for the past five years has been ship repairs manager with Messrs. Harland and Wolff, Ltd., is about to take up his new appointment as outside manager at the firm's Liverpool works. Mr. Cameron served his apprenticeship with Messrs. William Denny & Bros., and was afterwards nearly twenty years in the employment of Messrs. Sir James Laing & Sons, Ltd., Sunderland, being assistant manager for a number of years, and later occupying the post of yard manager up to the time of the closing of these works, when he entered the service of Messrs. Harland and Wolff. Mr. Cameron holds an Honours Certificate for Naval Architecture and Second Stage Mathematics.

MARINE MOTOR NOTES.

THE reproach that the Thames and its waterways have been lagging behind in the class of barges and similar craft appears to be on the eve of removal, in that indications are not wanting to show movements towards the introduction of more modern types of craft fitted with motors for propulsion. Messrs. Jas. Pollock, Sons & Co. have forwarded a descriptive booklet, illustrating the Bolinders direct reversible marine motor, suitable for coasters, lighters, towing launches and fishing boats. This motor is of the two cycle type and works with crude oil. The cycle of operations is as follows:—

The piston on its upward stroke draws the air into the crank case through the air valves, while the air above the piston, in the cylinder, is compressed; the piston, meanwhile, is nearing the ignition chamber; on reaching the ignition point the charge of crude oil is injected through the nozzle, then it is fired, the expanding gas drives the piston down, and in the operation the air in the crank case is compressed in turn, while the gases escape by the exhaust port and the compressed air cleanses the cylinders and gives the air necessary for the next charge. The ignition chamber has two ports, one through which fresh air enters each revolution, and the other for the injection of the oil. The *Bolinders VII* is stated to have run 20,000 miles; the *Travers* to have made a twenty-two days non-stop run and the *Lingueta* to have made a voyage from London to Brazil. Two more of the Scottish motor coasters have been launched. It is interesting to note that these vessels have six hands on the larger class. *i.e.*, 400 tonners. The cost of oil motors approximates about £8 to £9 per h.p.; the competition among the various makers tending to reduce the cost, to simplify the working parts and to an avoidance of extraneous additions with the privilege of patent rights attaching to them.

The consumption of oil for a motor developing 130 h.p. is not quite 7 gallons per hour on a steady coasting service, while for lubrication about ¼ gal. per hour is required. The desirability of having trained men to look after motors is made manifest in reckoning up the average consumption of oil, both for lubrication and fuel. An oil which is being used in some motor coasting vessels is obtained at 3½d. or 4d. per gallon. Solar oil has a specific gravity of about ·870 at 60 deg. F., flash point 120 deg. F., with a calorific value of 20,000 B.T.U. Scotch shale oil specific gravity ·863, flash point 228 deg. F., calorific value 18,500 B.T.U. The well-known firm of Messrs. Young have recently extended their plant and can produce a considerably greater quantity of shale oil per day than formerly. The enterprise of this firm will help to meet the increasing demand for the grade of oil which suits a large number of the marine motors now in general use. At the meeting of Messrs. Thornycroft it was proposed and agreed that the firm should concentrate attention on the manufacture of commercial and marine motors in preference to pleasure cars. One of Messrs. Thornycroft's recently constructed vessels is a twin-screw cargo boat about 75 feet long, for Peru. The trials were successfully carried out and a speed of nearly nine knots was obtained. One more well-known firm of steam engine and ship-builders has arranged to enter the field of makers of oil engines, that is Messrs. Palmer's Shipbuilding Co., who have chosen the Carels type of engine. The modifications and amended designs of marine types of oil engines which have been brought out during the last few months have been considerable, showing extended interest and increasing desire in connection with oil engines, in spite of the fears expressed in several directions that the price of oil will still tend upward, even when all the oil tank vessels under construction are occupied in distributing from the wells.

Large petroleum storage tanks are about to be erected, with the sanction of the local authority, at Grangemouth; such will doubtless be a great convenience for the motor coasters and lighters using the Forth and Clyde Canal, as oil suitable for motors will probably be stocked.

LIFE SAVING AT SEA.—Mr. Axel Welin recently gave a lecture before the Royal Society of Arts, on the subject of life saving at sea. The lecture, which was of an interesting and instructive character, was received with much appreciation.

ICE AND COLD STORAGE ASSOCIATION.

THE annual dinner of the Ice and Cold Storage Association was held on May 7th at the Hotel Cecil, presided over by Mr. J. T. Milton, president. The courses, of which the diners partook, were composed of refrigerated produce. Soup from Queensland (per favour of Mr. H. J. Webb, Central Markets), Canadian salmon (per favour of Sir Chas. Petrie, Liverpool), Egyptian quails (per favour of Messrs. Campbell, Key & Longley, Central Markets), Canterbury lamb (per favour of The Christchurch Meat Co., West Smithfield), chilled Argentine beef (per favour of The River Plate Fresh Meat Co., Holborn Viaduct), Australian apples (per favour of Messrs. F. W. Moore & Co., Arthur Street, E.C.).

After the loyal toasts were duly submitted and received with acclamation, Mr. R. H. Rew, C.B. (Assistant Secretary, Board of Agriculture and Fisheries), proposed "Refrigeration and the Oversea Dominions." Referring to the broad question of the services rendered by refrigeration and the special advantages accruing to the general community, Mr. Rew indicated that British farmers had hitherto somewhat resented the introduction of frozen produce, as detrimental to their interests, but they were less opposed to it now and more reconciled to the situation, realizing that there were advantages accruing to them in their own business from the process of refrigeration, as for instance, the demand for pedigree stock, although some of the other results might not appear advantageous. The dominions beyond the seas had claims upon Britain as the offspring from the mother country. The large numbers emigrating to various parts of the world were mostly to the lands where their relatives and friends had settled, and that being so the bonds of kinship were strengthened and increased by means of an interchange of commodities, the mother country sending manufactured goods and the dominions exchanging the produce of which they had an abundance to satisfy the requirements of the more congested population of the homeland. The study of refrigeration had done much to bring about many improvements in several directions, and these could still be added to. The value of food per annum used in the United Kingdom amounted to about £386,000,000; the value of imported food was about £206,000,000, the balance being the home supply.

The Hon. Thos. Mackenzie (High Commissioner, Dominion of New Zealand), in responding, said it was but natural that Great Britain should look to the oversea dominions to supply her own necessities, at the same time it spurred on the farmers and agriculturalists to cultivate with a view to supply the home market. The costs of labour were double in Australia, also the mileage to be travelled to reach ports of shipment markets was very great, and these factors added to the difficulties of the farmer, yet he overcame them and he was able to supply farm and dairy produce to the home market at very reasonable prices. The kinship between the mother country and the oversea dominions was maintained by trade and the warmth of feeling and loyalty strengthened, so that it was well that the tide of emigration should set towards Australia and Canada (rather than other countries)—aiming at preferential treatment for mutual advantage, prepared to support one another. Steps indeed had been taken to arrange a scheme for training the young men in military service so that they might be able to defend their own shores if and when required. The refrigerating industry was a powerful measure for good in knitting together the homeland and the dominions beyond the seas, and the trade and commerce of both had been increased enormously since the early ventures were made in the carriage of frozen produce.

Sir Thos. B. Robinson (Agent-General, Queensland) also responded, and describing some of his early experiences of refrigerating plant, related some interesting incidents to show the difficulties that had to be overcome by the pioneers and the enthusiasm which enabled them to carry on the work in spite of the difficulties. The progress of the science of refrigeration had been considerable and the carriage of beef and mutton and dairy produce had been followed by delicate fruits, which could now be carried and landed in good condition. Some improvement was wanted in the inspection of the produce, a label which could be readily and universally used might with advantage be adopted, by the co-operation of the importers. It was well that steps should be taken to arrange for the defence of their coast line and in Australia this was kept well in view, provision having been made to train their young men for military and naval service. Preferential treatment of produce and manufacture was advocated and practised with advantage alike to the buyer and seller.

Sir Jas. Crighton Browne, F.R.S. (Treasurer, Royal Institution) in proposing the toast of the evening, "The Cold Storage and Ice Association," said that but for cold storage it would have been hard for the population of Britain, and on the other hand, it had been the means of helping to build up the stamina of the people. He himself had an interest in refrigeration through the Royal Institution, and the research work carried on by scientists. Sir Jas. Dewar had done excellent service in liquifying hydrogen at a temperature of 250° cent. Experiments had determined that bacteria were held in a state of suspended animation at low temperatures and were not exterminated, hence it was important that very great care should be taken in dealing with produce in respect to cleanliness and freedom from bacteria. Higher organisms were killed off by extreme cold. There had been a prejudice against frozen meat, but it had been proved that there was no foundation for it, and it was wonderful how even the finer fruits had been brought from distant lands with success.

Mr. Milton in replying said the Association was representative of all those who were connected with cold storage. The Industry depended upon each branch maintaining its work to the highest degree of perfection and accuracy, whether in connection with the merchant or producer, the carrier, the engineer or the distributor. The importance of cleanliness, of critical temperatures to suit the various kinds of produce, of handling and of transporting was emphasised. The papers and discussions of the association had been most useful in spreading information, and the increasing membership would tend to add to its usefulness.

Mr. Chas. Page welcomed the visitors, who included many who were interested in the cold storage industries and he hoped that many who were present as guests would soon be members.

Mr. Alex. Boyle (Chief Engineer Consultative Dept. Board of Trade) responded and agreed that the Association was doing useful work and in the name of the visitors wished it prosperity.

SHIPWRIGHTS' COMPANY.

A SPECIAL court of the above Company was held on Wednesday, the 7th May, at the offices of Messrs. Harland & Wolff, Cockspur Street, S.W. (by kind permission of Lord Pirrie, K.P., Past Master), the Master (Mr. Bell White) presiding. He was supported by Sir Edward Clarke (Master-elect) and Lord Allerton, F.R.S. (Wardens), Lord Pirrie, K.P., and Dr. Clement Godson, V.D. (Past Masters), Mr. E. C. Kirkness, and the Clerk of the Company. A letter was read to the Court from Col. T. Davies Sewell, F.R.A.S., resigning his position as Hon. Treasurer to the Company, which was accepted with regret, and on the motion of the Master, seconded by Sir Edward Clarke, a vote of thanks was unanimously passed to Col. Sewell for his services to the Company for so many years in the capacities of clerk, acting clerk and hon. treasurer. A letter was also read from Mr. Cole resigning his appointment as Beadle to the Company, which was accepted and Mr. Richard Colnan was appointed beadle in his stead. An election was held to fill the vacancy on the Court of Assistants caused by the death of the late Mr. James Perkins, and Mr. Wynne E. Baxter, who for so many years had acted as Clerk to the Company, was unanimously elected. The following gentlemen were admitted to the Freedom and Livery of the Company:—Richard Henry Green, Esq., and Edward William Green, Esq., both of Messrs. R. & H. Green & Silley Weir, Ltd., Blackwall Yard, London, E.; Charles Cunningham Scott, Esq., of Scott's Shipbuilding & Engineering Co., Ltd., Greenock, and Capt. Richard Noal, marine superintendent of the Shaw, Savill and Albion Co., Ltd., of 34, Leadenhall Street, E.C. A cordial vote of thanks was accorded to Lord Pirrie for his kindness in granting the use of the Board-room for the Court.

MR. JOSEPH TREE.

MR. JOSEPH TREE, who for over forty-five years has been in the service, as engineer, of the Goole Steam Shipping Co. (now merged in the Lancashire and Yorkshire Railway Co.) and for the past twelve years superintendent engineer of the extensive fleet of the amalgamated concern, has recently retired from active service, and on the evening of May 15th, a large gathering of his former colleagues and subordinates met within the Lowther Hotel, Goole, to do him honour. Glowing testimony was borne to his excellent qualities, and to the high respect in which he was held, and he was made the recipient of a very tangible token of this general esteem. Mr. G. W. Winterbottom, local general manager of the Lancashire and Yorkshire Railway Co., presided over the company, which included Commander Atkins, R.N.R., marine superintendent; Mr. John Boyd, the new superintendent engineer; Mr. R. Tinn, of the Goole Shipbuilding and Engineering Co., etc. The Chairman in the course of a warmly appreciative speech said that Mr. Tree had had a very long career in the shipping trade. He saw from the particulars with which the committee had presented him, that Mr. Tree was born at Selby in 1848, and came to Goole in 1856. Having served his apprenticeship with Messrs. Watson, Peacock & Co., he was in 1868, when only twenty years of age, appointed second engineer of the s.s. *Londos* and served thereafter in a number of vessels of the late Goole Steam Shipping Co. In 1872 he was appointed chief engineer of the s.s. *Laura Fell*, and in 1874 he joined the Yorkshire Coal and Steam Shipping Co., Ltd., and went chief engineer of the s.s. *Dinnington*. This Company built up a very good fleet of steamers and as they were brought out Mr. Tree was chosen to take charge as guarantee engineer. In 1895 the Company was absorbed by the Goole Steam Shipping Co., Ltd., and Mr. Tree along with other employees passed over with the fleet. He was just about to be appointed superintendent engineer of the fleet when the amalgamation with the Lancashire & Yorkshire Co. took place, this event deferring the promotion. On the decease of Mr. Thompson, superintendent of the Goole Steam Shipping Co., in 1901, Mr. Tree was appointed his successor. Prior to this he had been for nine years chief engineer of the s.s. *Berlin*, and notwithstanding, as Mr. Winterbottom humorously declared, that a great many boats had since come into commission it would be difficult to convince Mr. Tree that any of them in anyway eclipsed the *Berlin*. In 1907 Mr. Tree was elected a member of the Institution of Naval Architects. Mr. Winterbottom in closing said that on behalf of the committee he had great pleasure in asking Mr. Tree to accept an illuminated address, subscribed to by many friends with whom he had been associated during his long business career, and of a purse of gold, as tokens of their very high respect for him and of their sincere hopes that he would be long spared to enjoy a very pleasant and prosperous retirement. Commander Atkin, Mr. A. W. Greenfield, Captain Mapplebeck and others, representing both the engineering and the Navigation branches of the service gave eloquent expression to the high esteem in which Mr. Tree was held all round and to the hearty good wishes going with him in his retirement.

CLYDE DREDGER'S WORK AT PANAMA.—According to accounts from Panama which reached this country in the early part of May, the Clyde-built dredger *Carozal* has completed a highly satisfactory first year's service at the western end of the great Isthmian Canal, one report stating that she is "doing work no other machine in existence could." These reports serve to recall the circumstances under which the United States Government departed from precedent, and in the face of stringent opposition from American shipbuilders and others interested, ordered the vessel, late in 1910, from the well-known dredger-building firm of Messrs. William Simons & Co., Renfrew, instead of from the American firms who quoted lowest for the contract. The Clyde firm's tender was no less than 399,340 dols., or over 50 per cent. under that of the American firm, and under these circumstances President Taft ordered the acceptance of the Scottish tender, a decision which caused no little indignation in certain American circles. The excellent work of the *Carozal* confirms the Isthmian Canal Commissioners and President Taft in the view they took when the Clyde-built vessel was ordered. The *Carozal* is a twin-screw bucket hopper dredger, having a nominal dredging capacity of 3,000 tons an hour and a hopper capacity of 1,200 tons of dredgings. Her bucket ladder was designed for dredging to a depth of 50 ft. below water level.

AN ENGINEER'S BRAVERY.

AN interesting ceremony took place at the South Western Hotel, Southampton, on the 19th of May, when Mr. E. H. Wallis, fourth engineer of the R.M.S.P. *Araguaya* was presented with a gold medal for bravery by the Secretary of the Marine Engineers' Association. On the 11th of January last, whilst the vessel was in dock here, an isolating valve chest on the centre forward boiler burst, killing three men and severely injuring several others. At the Board of Trade enquiry the accident was attributed to water hammer.

At the time of the explosion Mr. Wallis was on watch, and, on having his attention drawn to the matter, immediately attempted to reach the stop valve on the boiler, which was under steam at the time, but was driven back by the rush of steam and water. He then thought of the safety valve easing gear wires, which lead round the boiler shell, and by their aid he reached the top of the boiler, and eventually succeeded in closing the valve, his hands being badly scalded and torn. At the coroner's inquest, and also at the Board of Trade enquiry, Mr. Wallis' conduct was warmly praised, and he well merits the recognition which found tangible expression on the occasion of the presentation.

H.M.S. "KING GEORGE V."

THE four battleships of the "King George V." class (*King George V.*, *Ajax*, *Audacious* and *Centurion*) represent a bigger advance on their predecessors of the "Orion" class than appears at first sight. Originally it was intended that all eight should be sister ships, but certain defects in the *Orion* suggested alterations in the ships to follow which have considerably added to the fighting powers of these latter vessels of the "King George V." type.

Perhaps the most striking difference between the two classes is the absence of the big tripod mast in the *King George V.*, this structure having been replaced by a stout pole mast forward of the funnels which carries the fire director platform above and in front of the smoke, and a derrick-stump between the two funnels which carries the main boat-boom.

The difference in the size of the funnels also alters her profile, that forward in the *King George V.* being big and oblong with a small round uptake aft, while the bigger funnel in the *Orion* is the second one.

As regards armament, the big guns are of a later mark 13·5 in., and fire a 1,400 lb. projectile instead of the 1,250 lb. such as is discharged from the "Lion" and "Orion" class. Ten are carried, grouped in five twin 11 in. turrets so disposed that all can be trained on either beam, four forward, and four aft. The amidships guns have wider arcs of fire than those in the preceding ships, owing to the increase in length and the cutting away of the superstructures to a finer angle.

Compared with the *Orion*, the total volume of fire is 14,000 lbs. against 12,500 lbs. per broadside from the 13·5 in. guns.

The secondary battery of sixteen 4 in. pieces is distributed somewhat differently, twelve being mounted forward and only four aft, instead of eight at each end; this change was found advisable, as in practice, torpedo attack from the bow direction is far more frequent than from the stern quarter, and most of the ammunition for the after 4 in. guns had to be carried forward to feed those mounted there. It will be seen that there are three levels of gun ports forward, two guns on each side being placed on the forecastle deck, three in stepped-back casemates in the lower superstructure, and one in a single casemate over these; aft, there are two guns on different levels in the superstructure forward of the fourth barbette. All have 4 in. shields to act as splinter protectors.

This inadequate anti-torpedo attack equipment is the chief defect of the class and of all the English "Dreadnoughts." Why such a small calibre gun as the 4 in., should be mounted instead of 6 in., such as is almost universally fitted to contemporary battleships, is hard to understand. The later "Iron Duke" class have twelve 6 in., for a secondary battery, and such pieces might easily have been included in the "King George V." design. Of course it can be argued that

H.M. Battleship *King George V.*

H.M. Battle-Cruiser *Queen Mary*.

many naval men consider that the 4 in. projectile is quite enough to stop most torpedo craft, especially when they have such high commands as in British ships; certainly it is better to place them up in the superstructure than to range them along the main or upper decks, but a 6 in. on the lower level has more chance of stopping a large modern destroyer than has the smaller gun with the better firing angle.

But in any case, more than sixteen 4 in. could easily have been allowed for as some compensation for the absence of the 6 in. which it was confidently expected these ships would carry; there is ample room for other four small guns without risk of interference of fire, and one can easily conceive a special plan of torpedo attack wherein vessels of the "King George V." class would be approached from the stern quarter and so only have the opposition of the minimum number of guns. It would be interesting to know whether a trial attack could not be brought off to test whether advantage could possibly be taken of this weakness in fire concentration.

Her own torpedo equipment consists of three 21 in. tubes, one in the stern and one on each side, all below water. The *King George V.* is protected along the same lines as the *Orion*. Amidships for about 250 feet there is 11-12 in. armour, tapering to $7\frac{3}{4}$ in. below the end turrets and terminating as 4 in. fore and aft, leaving a space of about 30 feet unprotected in the bows and stern. Above this is a strake $9\frac{3}{4}$ in. thick along the main deck side which extends from the base of the first to that of the aftermost turret.

Details as to the thickness of the protected decks and bulkheads are wanting, but it is generally known that the internal armouring of the class is particularly thorough.

Driven by Parsons turbines of 31,000 H.P., the designed speed is 21 knots which was easily maintained and exceeded on trial. Steam is provided by Babcock boilers in the *King George* and *Ajax*, and Yarrow boilers in the *Centurion* and *Audacious*. The fuel supply is 900 tons normal and 2,700 tons maximum plus oil. Anti-rolling tanks are fitted, and with her large bilge-keels she has proved a magnificent sea boat.

The dimensions of the ship are:—Length 555 feet, beam 89 feet, draught 27 feet 6 inches, giving a displacement of 23,600 tons or 1,100 tons more than the *Orion*. All four of the class are launched, and the *King George V.* and *Centurion* have been on trial, the *Ajax* and *Audacious* having been delayed by the strikes last year. The following table shows them compared with contemporary foreign ships:—

TABLE.

Nation	Name	Tonnage.	Armament.	Torpedo Tubes.	Designed Sped	Coal.	Protection.			
							A	B	C	D
			in.				in.	in.	in.	in.
Argentine	Moreno	27,940	XII. 12 / XII. 6 / XII. 4	4	22·5	1000/4000	12-7½	6	12-5	9·6
Austria ..	Viribus Unitis ..	20 000	XII 12 / XII 6	4	20	900/2500	11	6	11-4	8
England ..	King George V...	23,600	X. 13 5 / XVI 4	3	21	1000/3700 + oil	11	4	12-4	12 4
France ..	Jean Bart ..	23.026	XII 12 / XXII 5 5	4	20	900/2700 + 1000 oil	12½	7	10¾·7	10-6
Germany	Kaiser	24,310	X. 12 2 / XIV. 6	5	21	1000/3600 + oil	12	7	12¾-5	7
Italy ..	Dante Alighieri..	19,400	XII. 12 / XX 4 7	3	22	1000/2500	9½	4	10-2	8¾
Japan ..	Kawachi ..	20,800	XII. 12 / X. 6 / XII. 4 7	5	20·5	900/2500	9	6	12-5	9
U S A. ..	Arkansas ..	26,000	XII 12 / XXI. 5	2	20·5	1500/3000 + oil	12	6½	11-5	6½

A — Big guns. B — Secondary guns. C — Belt. D — Side above belt.

Note re mast.—Since the above was written the *King George V.* has had her foremast re-inforced to steady the fire-director station.

H.M. BATTLE-CRUISER "QUEEN MARY."

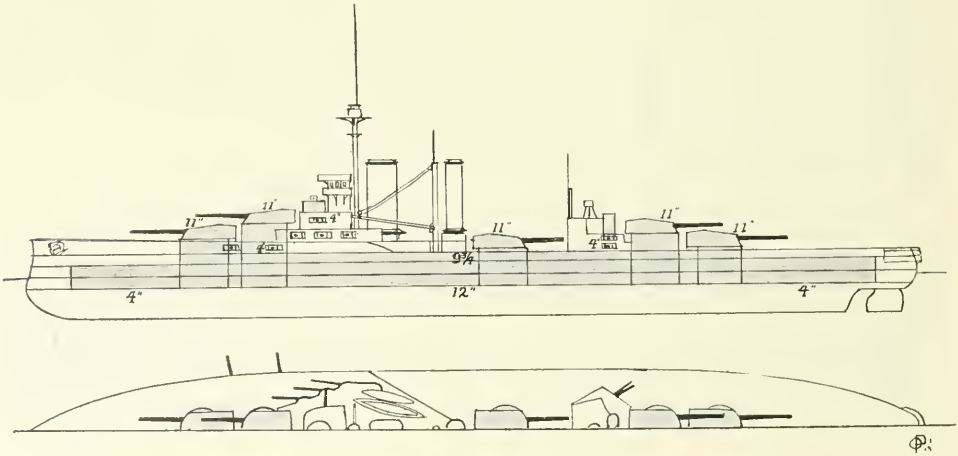
EXCEPT for differences in dimensions and horse-power, the *Queen Mary*, recently delivered from Messrs. Palmer's yard, is practically a sister to the *Lion* and *Princess Royal*, the particulars of the ships being as follows:—

Queen Mary.	*Lion.*
Displacement, 27,000 tons.	26,350 tons.
Length over all, 700 ft.	700 ft.
Beam, 89 ft.	87½ ft.
Draught, 28ft.	28 ft.
Engine Power, 80,000 h.p.	70,000 h.p.
Speed, 28 knots.	28 knots.

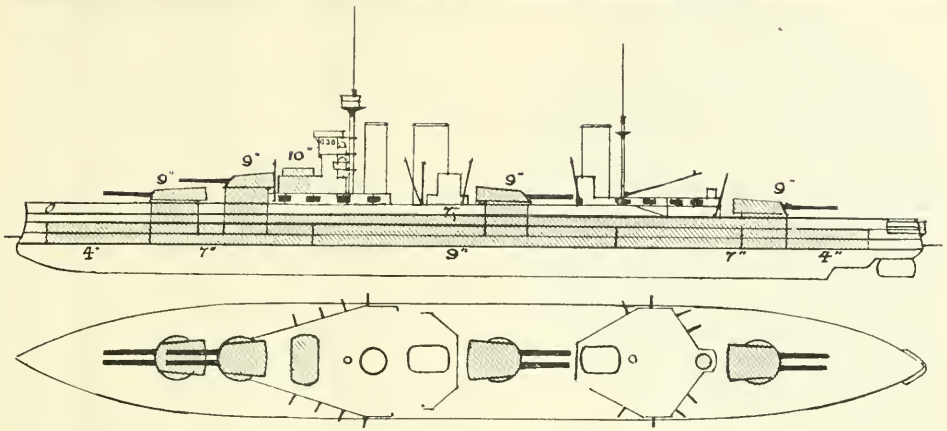
The designed speeds are nominally the same, but as the *Princess Royal* did about 29 knots on trial and the *Lion* nearly as well, it is anticipated that the *Queen Mary* with her extra 10,000 horse-power will improve on these figures, for the increased displacement is almost wholly absorbed by the additional engine power. So far as is known the armour protection is the same as in her sister ships.

The *Queen Mary* was laid down on March 6th, 1911, and launched March 20th, 1912, so that she has exceeded the official twenty-four months by some three months, which speaks well for the capacity of the Palmer yard to make up time lost through labour difficulties.

As originally designed she was to have had the same arrangement of masts and funnels as the *Lion* showed when first completed, *i.e.*, three short funnels spaced more widely apart forward, with a big tripod mast just abaft the foremost funnel. The alterations to the present arrangement necessitated by the intense heat developed from the generation of over 70,000 h.p. when the *Lion*



Plan of the Battleship *King George V.*



Plan of the Battle-Cruiser *Queen Mary*.

was running at full speed—a heat which made the control top and fore-bridge uninhabitable—has put an additional £25,000 on to the prime costs of the ship, bringing the total up to about £2,078,491.

The armament consists of eight 13·5" guns which throw a projectile of 1,400 lbs., disposed in four 9" turrets along the centre-line; two are forward, the second being raised to superfire, one amidships and the fourth aft. This arrangement is not a particularly happy one. The amidships turret has no axial fire and limited arcs of bearing on the beam, and a better disposition would have been secured by mounting four guns aft, as in the *Kongo*, recently completed in this country for Japan.

Sixteen 4" guns constitute the secondary battery, and these are disposed four forward and four aft on each beam. It will be noticed that those forward are all on the same level and not arranged as in the *Lion* and *Princess Royal*. All are fitted with 2" splinter shields, which constitute their sole protection.

As in the recent battleships of the "Orion" and "King George" classes, these battle-cruisers suffer from a weak secondary armament, and it is practically certain that the *Tiger*—the last battle-cruiser that we are likely to build—will have 6" guns like the "Iron Dukes" of which she is the cruiser edition.

Eight twin search-lights are mounted, four on the bridges forward, two on the blast-screen around the third funnel, and two on the superstructure aft. The torpedo armament consists of two 21" tubes, one submerged on each broadside.

The protection along the water-line is 9" armour amidships, thinning down to 7" and 4" at the ends, the extreme bow and stern sections being unarmoured. Above this is a similar strake along the lower deck side, while 7"-5" plates protect the main deck between the second and fourth turrets. Forward there is an exceptionally large oval conning tower 10" thick, while aft is a small control station.

At present the director platform is mounted on a pole-mast forward, but it is likely that tripod legs will be fitted to this later in order to minimise vibration.

The boats are stowed amidships between the funnels, where the screens afford them some sort of shelter, and aft in the superstructure, where they are housed below and out of sight.

The *Queen Mary's* machinery, built by Messrs. John Brown & Co., consists of Parsons turbines with a designed h.p. of 80,000, which will probaby reach 100,000 on trial. Boilers are Yarrow and fired by coal and oil, the capacity being 1,000 to 3,500 tons of the former and about 1,500 tons of the latter. These ships are enormous coal consumers at high speed—the *Lion* used something like 950 tons a day on trial.

In the following table they are compared with their contemporaries, and it will be seen that only Japan and Germany have as yet any battle-cruisers complete. The superiority of the British over the German ships lies in their gun power and speed; so far as armour goes, there is probably little to choose, and indeed the balance may be somewhat on the German side if the reported figures for the *Seydlitz* are correct. The Japanese *Kongo* is of British design and build and probably very nearly represents what the *Tiger* will be like. All these ships score in having powerful anti-torpedo batteries of 6" guns.

COMPARATIVE TABLE.

	Britain. *Queen Mary.*	Germany. *Seydlitz.*	Japan. *Kongo.*
Launched	1912.	1912.	1912.
Displacement	28,850 tons	25,000 tons	27,500 tons
Designed h.p.	80,000 h.p.	70,000 h.p.	68,000 h.p.
,, Speed	28 knots	27 knots	27 knots
Highest ,,	34 ,, (?)	28 ,, (?)	(?)
Armament	8 13·5" 16 4"	10 11" 12 6" 12 3"	8 14" 16 6" 12 3"
Torpedo Tubes	2 21"	4 19·5"	8
Armour—			
Belt	9"—4"	12"—4"	10"—6"
Lower Deck	7"—5"	9"	7"
Big Guns	10"—9"	9"	9¾"—10"
Secondary Guns	2"	6"	5"—6"
Deck	3"	1½"	2"
Coal	1,000/3,500	1,000/3,100	1,000/4,000
Oil	1,500 tons (?)	200 tons	1,000 tons

FOREIGN NOTES.

Austria.

THE t.s.s. *Baron Bruck* was launched on April 20th by the Cantiere S. Rocco-Muggia (Trieste) The vessel has been built under special survey of the Austrian Veritas and the British "Lloyd's Register" for highest class, and is to the order of the Austrian Lloyd for passenger service in the Adriatic Sea The vessel is of the following dimensions :—Length between p.p., 270 ft ; breadth moulded, 39 ft. 9 in. ; depth to main deck, 18 ft 2 in. ; depth to 'tween deck, 7 ft. 9 in. ; displacement, 2,500 tons at about 15 ft. 3 in. draught ; i.h.p., 4,400 and speed 17½ knots. She will have accommodation for eighty-five first-class passengers thirty-eight second-class passengers, one hundred third-class passengers, and a crew of forty-six The only space for cargo is 1,700 cubic feet in fore hold. She is a sister ship of *Baron Gautsch* and *Prinz Hohenlohe*, built three years ago in England. The propelling machinery consists of two triple-expansion engines with four tubular boilers and twelve furnaces. The boilers and engines have been built by the Stabilimento Tecnico Triestino, Trieste. The *Baron Bruck* will carry the mails for Dalmatia.

Argentine Republic.

The Government has placed an order for four torpedo boat destroyers with the Germania shipyard at Kiel. They are each to have a displacement of 1,250 tons and be equipped with powerful guns.

Chili.

At present six destroyers have been ordered and are in course of construction in this country. Their length is 325 ft. and they are to be fitted with engines of 29,000 i.h.p., giving to each vessel a speed of 31 knots. The first of these, *Admiral Lynch*, was launched last September, and the second, *Admiral Odell* at the end of January, the others will also soon be in the water.

Italy.

The new battleships of 30,000 tons, armed with nine guns of 38 cm. placed in three axial towers, are to be named *Dandola* and *Italia*. The armour is to have a thickness of 34 cm. and the projected speed is to be 25 knots. They are to be completed in the year 1916 The construction of one is to be entrusted to the Ansaldo shipyard, the other to the Odero shipyard. The entire cost of these ships when complete will be 75 million lires the hulls alone costing 45 millions. The sixth Italian Dreadnought *Duilio* has just been successfully launched in the presence of the King and Queen of Italy. Her completion is to be hastened as much as possible.

Roumania.

It is reported that the Government is preparing a new plan for strengthening the fleet, which will include the construction of six small armoured cruisers and twelve sea-going torpedo boats The port of Constantza, which forms the basis of the Roumanian fleet, is to be developed. It is further planned to build four monitors and eight patrol boats for service on the Danube.

Japan.

Public opinion is strongly in favour of increasing the strength of the fleet, which it is stated was in 1901 superior to the German and U.S.A fleets, but is now inferior. The only remedy is to build seventeen to eighteen large armoured vessels in about seven years. The battleship *Fuso*, of 31,000 tons, which was to have been equipped with twelve guns of 36 cm. is now to be supplied with ten guns of 39 cm. and sixteen of 5·2 cm. Engines of 45,000 h.p. are to give her a speed of 22 knots. Her keel was laid in March, of 1912 at the Kure shipyard. Three or possibly four further units are to be laid down as soon as the Budget has been voted. Three sub-marines are in course of construction at the Kure shipyard

Germany.

The cargo steamer *Wachtfels*, built at the Flensburg shipyard to the order of the Hansa Steamship Co., has been successfully put through her trial runs at sea. Her carrying capacity is 9,000 tons and she is fitted with a triple-expansion engine of 2,800 i.h.p.

The twin-screw cargo and passenger steamer *Bahia Castillo*, of 12,000 tons, built to the order of the Hamburg South American Steamship Co., at the Reiherstieg shipyard, has undergone her trial runs at sea with complete success. Two triple-expansion engines totalling 4,300 i.h.p. give the steamer a speed of 12½ knots. The vessel will accommodate 2,500 passengers and has fifty-two cabins for second-class passengers.

The Bremen Vulkan Shipyard and Engineering Works has just successfully launched a cargo steamer, *Althill Paul*, built to the order of the Fish Utilizing Co., Ltd., at Bremen. She is to serve a special purpose and has a carrying capacity of 1,800 tons. A large steam drying apparatus is installed on board in which the fish are dried and then ground to meal by special machinery, which is also carried on board for this purpose. The fish meal is then loaded into the holds. The vessel is provided with electric light and is equipped with a triple-expansion engine of 550 i.h.p., which drives her at a speed of 9 knots. Two boilers supply the necessary steam for the engine and also for a compound engine of 75 i.h.p. for working the fish drying and grinding machinery.

At the shipyard of Schichau at Danzig the petroleum tank motor vessel *Triton*, built to the order of the German American Petroleum Co., at Hamburg, has just been successfully launched. The *Triton* is 137 m. long with a beam of 175 m., her carrying capacity being 10,000 tons on a medium draught of 7·6 m. She will be fitted with a quadruple-expansion engine of 2,300 i.h.p. giving her a speed of 10 knots.

On May 12th the first half of the floating dock for the Vulcan Works at Stettin was launched.

The twin-screw passenger and cargo steamer *Bahia Laura* has just been successfully launched at the Bremen Vulkan shipyard at Vegesack, where she has been built to the order of the Hamburg South American Steamship Co. The length of the vessel is 155·45 m., beam 18 m. and her carrying capacity 12,800 tons on a draught of 8·64 m. Accommodation for a large number of passengers is provided. Derricks, cranes and steam winches totalling thirty-nine in number are provided for dealing with the cargo. Special arrangements are also provided for taking in coal rapidly. In the equipment are included a refrigerating plant, electric lighting, wireless installation, submarine sounding apparatus, and there are further thirty-six large lifeboats and collapsible boats on board. The engine plant consists of two three-cylinder engines working with superheated steam and developing 4,300 i.h.p., propelling the *Bahia Laura* at a speed of 13 knots. Two further steamers are in course of construction for the same steamship company at this yard.

The steamer *Lauterfels*, of 9,000 tons, built to the order of the Hansa Steamship Co. at Bremen, has been put through her trial runs at sea with great success ; the engines worked very satisfactorily, and developed 2,500 i.h.p., propelling her at a speed of 11½ knots. The same shipyard has five further steamers on her order books for the Hansa Co., which is now placing orders for three large cargo steamers of 12,000 tons. These steamers are to be equipped with all the latest improvements.

The screw steamer *Bulgaria* of 7,300 tons, belonging to the Hamburg-America Line, has been sold to the Austro-Americana Co. at Trieste, and has been given the name of *Canada*. The Hamburg-America Line has bought a steamer in this country called the *Georgistan*, which will receive the name of *Bulgaria*, to replace the steamer of this name sold to Trieste.

At the Tecklenborg shipyard the cargo steamer *Solfels* has just been launched. She has been built to the order of the Hansa Steamship Co. at Bremen. She has a carrying capacity of 9,200 tons, length 134 m., beam 17 m., height 10 m. She is equipped with a triple-expansion engine developing 3,000 i.h.p., giving the steamer when fully loaded a speed of 11·5 knots.

The twin-screw petroleum tank motor vessel *Loki*, built to the order of the German-American Petroleum Co., has been successfully launched at the Germania shipyard. The contracted carrying capacity of the vessel is 8,370 tons. At the same shipyard a further motor tank vessel of 15,000 tons is also in course of construction to be launched in the autumn. This vessel and the *Loki* are both built on the longitudinal frame system.

France.

Orders for three large steamers have been placed with the Ateliers et Chantiers de France at Dunkirk by English shipping companies. The vessels are of the following dimensions:—Length, 145 m.; beam, 18 m., and they will be of 16,000 tons displacement. They are to be fitted with powerful engines and twin screws and attain a high speed, so as to be able to complete the long ocean voyage between this country and New Zealand in as short a time as possible. Their equipment will include a wireless installation, a refrigerating plant, ample boat accommodation, electric lighting and ventilation, etc. The shipping firm Daher et Cie, Marseilles, have placed an order with the Ateliers et Chantiers de France for a cargo steamer of 3,500 tons, which is to be named *Sainte Marguerite*. She is specially fitted to take goods of great bulk, one of the hatches being able to admit complete railway carriages of 24 m. length. Her completion is to be hurried so that she may be put into service by the autumn. Her launch is to take place at the commencement of the month of June.

At Cherbourg a new submarine, *Gustave Zédé*, will be launched very shortly. She is of an entirely new type and has greater dimensions than any of the existing submarines. This submarine has a displacement of 797 tons and is 74 m. long and has a speed of 20 knots on the surface. She will be supplied with eight torpedo tubes and will be manned by a complement of thirty-seven men and three officers. It is claimed for the *Gustave Zédé* that she will serve two purposes, as torpedo boat and as submarine, and will on account of her speed be able to select her position of attack and then to submerge and serve as submarine.

The cargo steamer *Saint Vincent*, built to the order of the Société Navale de L'Ouest at Havre, and which has just been launched at the Ateliers et Chantiers de France, is a vessel of fine construction of the following dimensions—length 107 m., and beam 16 m. The vessel has been specially adapted for the transport of wine from Algeria to France, and will have a speed of 11 knots.

U.S.A.

The battleship *Wyoming* attained on its trial runs a speed of 22 knots.

The Fore River Shipbuilding Co. at Quincey, Mass., has just launched the destroyer *Duncan* of 1,010 tons displacement and 91·4 m. long. She will be fitted with engines of 16,000 i.h.p., which will impart a speed of 29 knots to the vessel. Her armament will consist of four guns of 101 mm. and four torpedo tubes.

The experiments recently conducted on the collier *Jupiter* to transmit the power of the turbine machinery to the propeller shaft by means of electricity are considered to be very satisfactory.

MR. S. C. OLDHAM.

Mr. S. C. Oldham has recently been appointed general manager of the extensive Dry Docks and Ship Repairing Works of Messrs. Clover, Clayton and Co., Birkenhead.

As regards ship repairing Mr. Oldham is a recognised authority, having spent many years at this special branch of the business. For 5½ years Mr. Oldham held the position of repairs manager with Messrs Cammell, Laird & Co., and is thus well known amongst the shipping interests on the Mersey. Beginning his career as a premium apprentice with Messrs. Workman, Clark & Co., Ltd., of Belfast. Mr. Oldham became later assistant yard manager. For twelve years he acted as repairs manager to the same firm, leaving Belfast to take a similar position with Messrs. Cammell, Laird and Co., Ltd. The subject of this notice was recently the recipient of a handsome presentation on behalf of his late *confrères*, Mrs. Oldham being also included in the pleasant function. Mr. Oldham is a member of the Institution of Naval Architects, and is deservedly popular amongst a large circle of friends, whose best wishes will follow him in his new sphere of activity.

MR. S. C. OLDHAM.

REVIEWS.

Kelly's Directory of the Engineers, Iron and Metal Trades, 1913. London: Kelly's Directories, Ltd. Price 30s.

THIS directory, now in its 12th edition, was first issued forty-four years ago. It has since been published at intervals of four years, each edition having increased in bulk; the present extends to no less than 1940 pages, or 76 pages more than its immediate predecessor. The Directory comprises every calling in any way connected with the profession and the industries specified and connected with metal, or having any connection with, or affinity to engineering, from the first raising of the ores from the mines in this country, or their importation here, through all the various processes to which the metals are subjected until the immense variety of articles composed thereof have been produced in their most finished forms. Some idea of the time and labour consumed and expense incurred in compiling this work may be formed from the fact that all the places dealt with, over 10,000 in number, have been specially visited, and the particulars relating to each firm have been personally taken by the proprietors' agents.

Rhodes' Directory of Passenger Steamers, 1913. London: George Philip & Son, Ltd. Price 2s. 6d. nett.

IN the present edition of this register of passenger steamers, now in its 26th year of issue, the information has, as usual, been brought up to date. The volume contains particulars of all the most important passenger steamers afloat arranged in a convenient manner. The ever-growing interest in the magnificent liners belonging to the various countries, and more especially those sailing under the British flag, gives an increasing interest and, we may add, utility to the book, nearly everyone nowadays wishing at some time or other to turn to a handy work of reference for details of some passenger steamer. The present issue contains a detailed description of some new steamers built for an American company in connection with the Panama Canal traffic, which it is satisfactory to note have been built by Messrs. Workman, Clark & Co., of Belfast. There are several illustrations of representative liners.

Macdonald's Irish Directory and Gazetteer. Edinburgh: Wm. Macdonald & Co., Ltd. Price 21s. (12s. 6d. if ordered before publication).

MACDONALD'S Irish Directory, now in its 26th annual edition, is the most useful directory of Ireland published. It contains lengthy classified lists of the manufacturers, merchants, agents and dealers in every Irish village, town and city of any importance. A most comprehensive Gazetteer, giving location, population and other local statistics, is embodied in the publication. For the purpose of circularizing and as a book of reference the publication will be found invaluable to the business man. Several new features have been added to

the edition, which includes an official list of the county councillors throughout Ireland. The Directory has undergone a complete and thorough revision since the 25th edition, for the purpose of which personal application has been made at all places to verify names, etc. Sections for Liverpool and Glasgow are included, owing to the extensive business relations which have for so long existed between Ireland and these important cities. The town plans and railway map of Ireland are most useful additions to the Directory, which is well printed and bound.

Wannan's Marine Engineer's Guide, Parts 1 and 2. London: Crosby Lockwood & Son, 1913. Price, 2 vols., 12/. That this well-known guide has reached its fifth edition is we think sufficient proof of its efficacy, and brought up-to-date as it now is, with the recent Board of Trade Regulations included, will be found to be of increasing value accordingly. It will be noticed that the work is divided into two parts for convenience of handling. The first part may be said to be the theoretical portion from a broad point of view and the second the practical. In the first we begin with arithmetic in its simple forms. Then follows mensuration, leading to exercises on what the engineer will require to calculate in his daily work. Thus we are led up to rules and formulæ. These are made as easy as it is possible to make them to answer any questions that may be set. They relate to pumps, boilers, engines, propellers and speed connected with the ship, followed by others for general mechanical powers, beams, levers, screws and so on. With this basis to work upon, we then find actual examination papers set, showing the way they are worked out; a similar plan is then followed for the first-class examination as for the second, the problems only being naturally more difficult.

In part two we begin with elementaries, the properties of metals used in constructions and the uses to which they are put, with drawings showing the made-up articles, such as boilers and fittings; questions and answers being interspersed. In the engine details we find link motion and the special forms of valve gear, such as Joy's and Marshall's. Air and centrifugal pumps are next discussed with governors to follow, noting the Westinghouse and Aspinall types. Paddle-wheel engines are a feature and details, such as a stern tube and shaft, with slide valves, lap and lead, claim attention, and we find Howden and Ellis and Eaves draught systems shown, with the means of measuring the air pressure. The water-tube boiler department is not neglected and the difficult problem of regulating the feed is considered. The turbine is noticed, with the Parsons system as an example, followed by refrigeration with the machine of Messrs. J. & E. Hall. In feed-water heaters we have the Weir's type with the Worthington pump. Filters and evaporators are noticed also, the latter with Morison's. The electrical department is treated next, and the principles of the dynamo and the double-wire system of lighting fully explained. The section of an arc lamp is shown, as well as in circuit with resistance coils. Brown's hydraulic gear for working cranes and various forms of steering gear follow. Oil motors complete what may be described as the apparatus section of the book, and with the questions and answers relating to the details as they proceed, it is possible for the student to adequately check his knowledge as he goes along.

In chapter twelve we have indicator diagrams fully described, and further questions are followed by rules for drawing and numerous examples, starting from the slide valve, blow-off cock, crankshaft and the various parts of the engine and boiler on separate sheets, so that they are easy to study and trace if need be and all dimensions clear. There are thirty-seven pages of these drawings, showing the thoroughness with which the subject is treated. We can only say in conclusion that the method of question and answer followed here seems to us to be a very appropriate one for the purpose of passing an examination like that of the Board of Trade, as the candidate can in a great measure assist himself and might in some cases dispense with a tutor's services entirely. We have nothing but commendation for what we find in these pages which must be the outcome of long experience in this class of tuition.

Real Life at Sea. By Capt. Wm. R. Lord. London and Felling-on-Tyne: The Walter Scott Publishing Co., Ltd., Price 3s. 6d.

To the author of this book, Capt. William R. Lord, we are indebted for a most interesting and readable story of life at sea. The volume, which runs to 374 pages of reading matter contains six illustrations by the author which have been executed with considerable skill. The volume opens with an account of the author's early days at sea and his life on the coasting brig *Lavinia*, on which vessel he held the position of cook and cabin boy at £1 per month. The lot of a ship's boy in his day was not a happy one, but the details set out by the author go to show that the coasting trade, if a hard school, was yet one which taught the duties of a sailor. The wreck of the *Lavinia*, in which the author sailed for a considerable time, is graphically told. This occurred in a gale off the Scilly Islands, during which eight other vessels were driven ashore, but no lives were lost. In the same gale the fine tea clipper *Friar Tuck* was driven on the rocks and the author states how "the harbour was literally coated with several inches of good China tea which had been disgorged from the ship and it was quite common to see a contingent of all sorts and conditions of women wading in water, scooping up all the floating tea they could lay their hands on." We read of the young sailor's progress in the career he had chosen, passing from boy to ordinary seaman and then to A.B., and how having completed the necessary time at sea he secured his second mate's certificate, and in that grade obtained a berth in the timber droger *Bombay Packet*. When on the *Chimborazo* as an A.B. the author tells an amusing story of the captain of that vessel. The captain "was an excellent commander and a good navigator and he was also a kind of walking barometer. He always wore a tall hat—an odd headgear for the captain of a ship and he had two for sea use—one for fine weather and one for bad. By noticing which hat he wore we could always tell in advance what weather to expect and were never far wrong." "The same captain used to smoke from 15 to 20 cigars a day and was between 65 and 70 years of age." Our author's next step was to pass for mate, and in this position was not long after appointed to the barque *Cowslip* of 600 tons burthen. After further voyaging Mr. Lord went up for his master's ticket, which he obtained and was soon appointed to the command of the *Sancho*, an A1 copper-bottomed vessel of about 530 tons burthen, in which he sailed for seven years, and from which he transferred to his first steamer, the *Blyth*, a fine little vessel of 1,000 tons burthen. The *Crane*, a steamer whose carrying capacity was 3,000 tons, was Capt. Lord's next ship, and in speaking of her he says "she seemed a monster to me and indeed at that time (1879) she was generally allowed to be a large vessel." No better illustration of the vast strides made in the increase of size of ships from that date to the present time could be given than by this remark. We have read Capt. Lord's reminiscences with great interest, the chronicles of his voyaging afford most pleasant and entertaining reading, and we are pleased that we have had an opportunity to read this noteworthy account of sea life by one who has had to struggle for himself and by sheer dogged perseverance and ability, honourably won his way to the place of command.

Directory of Merchants, Manufacturers and Shippers of the World for 1913. London: Kelly's Directories, Ltd., High Holborn. Price, 36/-.

This extremely useful directory, now in its 27th year of issue, contains over 3,450 closely printed pages on the majority of which as many as 400 names are to be found. The volume is intended for the use of merchants all over the world and the headings throughout are given in English and French and further also in the commercial language of the country to which any particular section refers. The information given relates to little short of 20,000 foreign and colonial cities and towns and there are nearly 1,250,000 trade classifications given under them. The indices give some 150,000 references and are of so complete a nature that by the use of the first index the pages relating to any individual place can be ascertained in a moment, and by the use of the "Index to Trades" a merchant carrying on any particular trade at any particular place can be found with equal facility; and this, too, by both the English and the foreign merchant, as the latter has for the purpose only to make use of the indices to trades given in French, German and Spanish. There can be no doubt that the directory should be of the utmost value to those anxious to create or extend foreign business relations as the book is a reliable guide to both the import and export trades of the world and much information is given in it which is not to be found in any other directory.

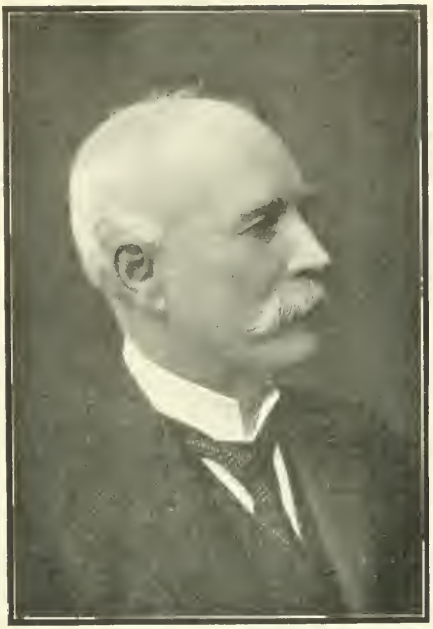
The regulations in force with reference to commercial travellers and their samples, which are often both vexatious and onerous are also fully set out at the commencement of the work. The object of the alphabetical lists of the names of the really important traders of all kinds in the United Kingdom with their telegraphic addresses (extending to 456 closely printed pages) is to enable the English and foreign trader to ascertain at once the full address and exact character of the business carried on by any particular merchant or firm in this country with whom it may be desired to communicate, and the trouble of searching for the information in the classified trade section is thus obviated. In no other book published is it possible to find full accurate alphabetical lists of the leading members of the entire British mercantile community.

OBITUARY.

James Walker.

MR. JAS. WALKER, the founder of the well-known firm of Messrs. Jas. Walker & Co., packing manufacturers, passed away on May 8th at the age of 73. He was born in Edinburgh, and when about 22 years of age he left his native land to seek work and develop enterprise in Australia. He was employed there in connection with engineering work for some years. Returning to Britain, he turned his attention to design a packing which would merit the attention of steam users on land and sea, by its reliability; the result was the introduction to the market of "Lion" packing in 1882, and the founding of the firm. Mr. Walker was well known for his genial disposition and many will hear with regret of his death, which occurred at his home in Leytonstone, Essex.

The late PETER BOYD, R.N.R., R.D.



The late HUGH DUNSMUIR.

Peter Boyd, R.N.R., R.D.

It is with regret we have to record the death (which occurred somewhat suddenly on May 4th at Earl's Court Square, London), of Mr. Peter Boyd, in the 68th year of his age. This regretful event has removed one whose experience as a marine engineer extended over an interesting period of transition from the simple to the compound engine with the gradually increasing steam pressure, then to the triple and to the turbine. Born in Midlothian about the year 1845, he was educated and brought up in Edinburgh, and served his engineering apprenticeship with a firm in the neighbourhood. He afterwards worked for a year or two gaining experience, and went to sea in 1868, when he joined the service of the British India Steam Navigation Co. as a junior engineer in the s.s. *Ethiopia*, built by Messrs. Denny, Dumbarton, and about to proceed to India on her first voyage. Remaining for some years on the Indian coast service of the company, he received his promotion through the various grades to chief engineer. He was subsequently transferred to the home line service about 1879, and sailed as chief engineer till 1907, when he retired on a pension allowance. During his more recent years at sea, Mr. Boyd was chief engineer of the *Dilwara*, while engaged in the transport service carrying troops during the season, and when the newer steamer *Rewa*, built in 1905 by Messrs. Denny and fitted with turbine engines, was placed on the service, he was appointed chief engineer and continued for a season until his retirement. His total active service in the British India Company was about 39 years. Mr. Boyd was a member of the Royal Naval Reserve and the time he served as chief engineer of steamers occupied in the Admiralty transport service covered a period of about twelve years, sailing from Southampton to the East and to South Africa, during which he earned the distinction R.D. He was one of the original members of the Institute of Marine Engineers, in which he took a warm interest, and was present at the annual meeting in March. He was a vice-president of the Institute, session 1906 7, as a representative sea-going engineer.

Hugh Dunsmuir.

By the death of Mr Hugh Dunsmuir, chairman of the firm of Messrs. Dunsmuir & Jackson, Govan Engine Works, Glasgow, a well known figure in Clyde engineering circles has passed away. His decease took place on May 10th at his residence, Matheran, Pollokshields. Mr Dunsmuir, who was in his 72nd year, was a native of Ayrshire, and served his apprenticeship as an engineer with Messrs Robert Napier and Sons in that renowned firm's Lancefield Works. While still in his youth he was employed as engineer on one of the Firth of Clyde paddle steamers, and when the American Civil War broke out he took an engagement on one of the fast Clyde paddle steamers which were requisitioned to run the blockade at American ports. He served as chief engineer for several voyages on board a speedy vessel, which, as the P.S. *Neptune*, had run on the Clyde previously. This steamer the product of Messrs. Napier & Sons—besides being very fast for the time, embodied not a few novelties, such as double diagonal engines running at high speed, Giffard's patent injectors, superheaters in the funnel uptake, small paddle wheels with iron floats, etc., and was put under the charge of Mr. Dunsmuir, then a full-fledged marine engineer. She was the swiftest vessel on the Clyde, attaining a speed of 21 miles an hour with engines making 73 revolutions per minute. After the *Neptune's* fourth successful run between Havana and Mobile, Mr. Dunsmuir, who had unsuccessfully applied for an advance in salary from the owners, whose profits in the venture were enormous, on being refused, at once resigned. His retirement from this post was fortunately timed, as on the voyage following, the vessel was captured and was afterwards employed as a watching or detective scout against other blockade runners, and eventually wrecked. Mr. Dunsmuir for some years thereafter served with several ship-owning Companies in India. Mr. Jackson retired from the firm about three years ago, and at the same time Mr. Geo. A. Dunsmuir, eldest son of Mr. Dunsmuir, was made a director. Returning to Glasgow in 1873 he became a partner in the engineering firm of Messrs. Dunsmuir, Muir & Co., now Messrs. Muir & Houston, Kinning Park. Retiring from that concern in 1876 he joined with Mr. William Jackson, who like himself had served his apprenticeship with the Napier firm, in establishing the firm of Messrs. Dunsmuir and Jackson, Govan Engine Works. From comparatively small beginnings the firm rapidly prospered, and in greatly extended premises, employing about 1,000 workmen, has for years past manufactured engines and boilers for many different types of steamers built on the Clyde and other centres. For service in India Mr. Dunsmuir fitted a vessel of light draught with three-cylinder triple-expansion engines of his own invention, one set of which, placed athwartship, drove three screws. For various reasons, however, Mr. Dunsmuir's ingenious and economical arrangement of propulsive machinery for light draught vessels did not develop. Deceased confined himself to business affairs, and took little or no part in public concerns. He leaves a family of four sons and two daughters, two of the sons being engaged in the business of the firm, Mr. Geo. A. Dunsmuir now succeeding to the chairmanship in place of his father.

Robert Steele.

The death took place at his residence, 12, Kensington Court Mansions, London, on May 2nd, of Mr. Robert Steele, M.I.N.A., M.I.Mech.E., M.I.Mar.E., etc., naval architect and consulting engineer, eldest son of the late Mr. Robert Steele, shipbuilder, Greenock, and great-grandson of the founder of the firm of Robert Steele & Co., Greenock, which, dating from 1786, became world-renowned for their famous China sailing clippers, and also as pioneers in steamship building. Deceased who was in his 54th year, was born at Greenock and received his education at Mostyn House, Cheshire, and at Merchiston Castle School, Edinburgh. He served his apprenticeship in the family yard at Greenock, and after working through the various practical departments and engaging in the supervision of constructional work in the family yard he went abroad for some time. In 1887 he returned home and shortly after was appointed manager of Messrs. A. McMillan & Son, Dumbarton, where he remained for about two years. In 1889, he began practice on his own account in London, as consulting naval architect and engineer. Through his great technical ability and his capacity for quickly assimilating details, his tireless energy and the conspicuous tact with which he met all difficulties, he soon became widely known in shipping and ship-insurance circles as a sound and reliable expert in cases coming before the Admiralty, commercial and arbitration courts. Among the clients for whom he acted were the British Admiralty—in the *Olympic* and *Hawke* collision—and many British and foreign underwriters and owners, including the Royal Mail, Atlantic Transport, Hamburg-America, La Veloce of Genoa and Laesz of Hamburg. He was also consulting engineer and adviser to the South-Eastern and Chatham Railway Co. He was a member of the Institution of Naval Architects, of the Institute of Mechanical Engineers, of the Inst. of Marine Engineers and of the North-East Coast Inst. of Engineers and Shipbuilders. His remains were interred on May 6th in West Hampstead Cemetery, West Hampstead.

The late MR. ROBERT STEELE.

BOARD OF TRADE EXAMINATIONS.

APRIL 24th, 1913.—LONDON.—*Ex. 1st Class:* H. Sawyer, T. Smartt. *1st Class:* E. Story. *2nd Class:* J. Laurie, T. Nixon, B. Palmer, J. Palmer, H. Peters.

GREENOCK.—*1st Class:* J. Blair, W. Duncan, J. McIntyre, J. Mackay, R. Smail, J. Spencer. *2nd Class:* R. Harrison, W. McGillivray, G. Steele.

SUNDERLAND—*2nd Class:* J. Innes, D. Johnstone.

LONDONDERRY.—*2nd Class:* R. Quiery.

BRISTOL.—*2nd Class:* F. Cooper, A. Robinson.

HULL.—*Ex. 1st Class:* F. Schumm. *1st Class:* C. Johnson, G. Nicholson. *2nd Class:* P. Boaler.

LIVERPOOL.—*1st Class:* W. Herriott, J. Rae, F. Rochell. *2nd Class:* E. Edgar, R. Marchington, D. Williams.

ABERDEEN.—*1st Class:* W. Beaton, A. Clark, J. Sim. *2nd Class:* R. Fothergill, J. McPherson, C. Robertson.

CARDIFF.—*Ex. 1st Class:* C. Payne.

NORTH SHIELDS.—*Ex. 1st Class:* C. Auld, T. Ferrier, J. Mullin. *1st Class:* R. Boulby, A. Clough, R. Dunn, W. Fleck, F. Gregory, H. Scott. *2nd Class:* F. Brown, W. Henderson.

WEST HARTLEPOOL.—*Ex. 1st Class:* J. Smithson.

GLASGOW.—*Ex. 1st Class:* R. Stevenson.

MAY 1st, 1913.—LONDON.—*1st Class :* J. Peters. *2nd Class :* W. Collister, H. Morgan, P. Sinclair.

GLASGOW.—*1st Class :* J. Crichton, H. McAllister, J. McFarlane, J. Mackintosh, J. Scott. *2nd Class :* J. Carson, J. Emerson, W. Johnstone, R. Lockhart, A. Mackenzie, J. McKinnon, R. McIvill.

LEITH.—*1st Class :* R. Callen, W. Gillam. *2nd Class :* A. Gilmour, J. McBain, A. Ross, A. Thompson.

BELFAST.—*1st Class :* J. Correll. *2nd Class :* W. Cherry, J. Cole, T. Keith, W. Killop, D. Owens.

LIVERPOOL.—*1st Class :* J. Crawford, J. Holiday. *2nd Class :* C. Early-Brown, E. Edgeley, J. Hyde, C. Shipway, W. Steen, J. Wheeler, W. Williams.

SOUTHAMPTON.—*2nd Class :* P. Marett, R. Sanger.

CARDIFF.—*1st Class :* J. Bewick, H. Richards. *2nd Class :* W. Akhurst, T. Heatley, H. Johnson, D. Ross, W. Thomas, E. Tucker.

NORTH SHIELDS.—*1st Class :* A. Atkinson. *2nd Class :* W. Baxter, W. Cay, H. Inness, R. Pearson, E. Stamthorp.

BARROW.—*Ex. 1st Class :* F. Smith.

MAY 8th, 1913.—LONDON.—*1st Class :* A. D'Agorne. *2nd Class :* W. Erson, J. Hay, C. Jarreld, R. Jenkins, R. Ritchie.

NORTH SHIELDS.—*1st Class :* T. Grainger, J. Mann, R. Thomas. *2nd Class :* J. Alexander, W. Atkinson, B. Hardy, R. Marshall, W. Riseborough, W. Ruddock, M. Thirlwell, R. Watson.

LIVERPOOL.—*1st Class :* J. Griffiths, J. Holland. *2nd Class :* R. Campion, S. Evans, F. Holt, T. Longmuir, J. Montgomery.

GLASGOW.—*1st Class :* J. Campbell, J. Duncan, J. Marshall. *2nd Class :* J. McGown, J. Mander, R. Whitelaw.

MAY 15th, 1913.—LONDON.—*1st Class :* S. Evans. *2nd Class :* J. Coveney, F. Davis, J. Howard, C. Lewis, J. Middleton, P. Roberts, R. Stewart.

NORTH SHIELDS.—*1st Class :* A. Arrowsmith, J. Scott, J. Tulip, H. Wilson. *2nd Class :* B. Hanson, J. Hodgson, S. Nutman, J. Reoch, J. Whitfield.

LIVERPOOL.—*1st Class :* G. Davies, A. McGregor. *2nd Class :* J. Wannop.

DUBLIN.—*2nd Class :* E. McMaster, P. Starrs.

GREENOCK.—*1st Class :* A. McInnes, J. Sword. *2nd Class :* J. Drennan, H. Mackintosh, J. McMurchy, D. Young.

HULL.—*1st Class :* J. Watt, W. Wrigglesworth. *2nd Class :* N. Crichton.

MAY 22nd, 1913.—LONDON.—*1st Class :* H. Macneil, H. Mitchell. *2nd Class :* L. Chamburt, W. Clarke, N. Lockhart.

LEITH.—*1st Class :* J. Anderson, J. Campbell, W. Stevenson. *2nd Class :* J. Braid, R. Hannah, J. Taylor.

WEST HARTLEPOOL.—*1st Class :* J. Cassidy, C. Crozier, R. Klottrup, W. Smithwaite. *2nd Class :* R. Coulson, A. Prentice.

PLYMOUTH.—*2nd Class :* G. Blackler.

SOUTHAMPTON.—*1st Class :* T. Braidwood, H. Cole. *2nd Class :* W. Elder, J. Stobo.

LIVERPOOL.—*1st Class :* E. Humble. *2nd Class :* G. Coombs, J. Davies, E. Nappey, H. Robert, W. Stopforth, H. Treeby.

CARDIFF.—*1st Class :* E. Jordan, H. Liscombe. *2nd Class :* H. Davidson, W. Goodall, J. Roberts, A. Wisbey.

NORTH SHIELDS.—*1st Class :* C. Bell. *2nd Class :* J. Barber, J. Nikas.

GLASGOW.—*1st Class :* J. Hosie, F. Murie. *2nd Class :* J. Carnochan, W. Jack, D. Kerr, J. Stewart, A. Williamson.

INTERNAL COMBUSTION PUMPS.

THE Institute of Marine Engineers, the Association of Engineers in Charge, and the Junior Institution of Engineers paid a visit on May 24th to the Metropolitan Water Board Reservoir at Chingford, when Mr. Humphrey gave a descriptive lecture on the internal combustion pumps installed in the pumping house, and demonstrations were also given to show the action of the installation in the outflow to the reservoir. There was a large attendance of interested visitors, and votes of thanks were accorded to the Chief Engineer of the Board, Mr. Bryan, Mr. Humphrey, and Mr. Deveral, Resident Engineer, for their kindness in providing much food for thought to the assembled company.

The vast supply of water required for London and district is an increasing quantity, and the necessity for additional reserve capacity brought into being the new reservoir, which has a capacity of about 3,000,000,000 gallons. It was a bold venture to accept a tender for the installation of the comparatively new system of pumping arrangement, but it appears to be justified in the results so far attained. The body of water expelled to the reservoir with each impulse of the pump is 15 to 20 tons, and this takes place at about seven seconds each impulse. The plant embraces the gas-making, the gas accumulator, and the pump-house, this is equivalent in the ordinary station to the boilers and the pumps when steam is the motive power, or gas engines and pumps when gas is used for generating power to act on pistons. In the Humphrey pump the piston can be dispensed with, a body of water serves the purpose, being acted and re-acted upon with the vigour required to compel the discharge through the outlet pipe. There are five pumps in the series, four of a capacity of about 40,000,000 gallons per day, and one of about 20,000,000 gallons. One of the series was shown at work discharging into the reservoir from the River Lea, the height being about 25 feet to the terrace over the reservoir, through 4-feet pipes. The action of the pumps is on the following principle. There is a large cylinder about 7 feet in diameter, surmounted by an explosive chamber with cast-steel head. The mixture of gas and air, on being ignited, acts on a body of water which is set in motion ; this is transmitted along the pipe line, and when the re-action takes place, due to the expansion and fall in pressure, the adjacent body of water enters, and forms, as it were, a suction stroke for the fresh incoming water ; the exhaust gases are then expelled and a fresh charge admitted for the discharge of the body of water drawn into the system.

In his lecture to the Royal Institution, Mr. Humphrey referred to several possible modifications of the principle on which his design of pump is constructed. Thus in place of having a body of water acted and re-acted upon by the explosive mixture, a piston may be substituted with advantage in certain cases ; and it was suggested that this modification could be utilised for marine propulsion either by the direct use of the jet propeller system, or through the medium of water turbines keyed on the propeller shafting, the pumps being the power to actuate the turbines. The possibilities in connection with this form of pump cover a large ground, and one other illustration was given to show its adaptability for air compression. The substitution of a solid piston on which the action and re-action took place, in experiments made, showed that quite 190 cycles per minute could be obtained, and the efficiency of the cycle was very high.

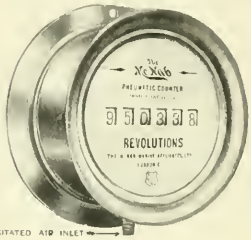
STEAM TRAINING SHIP "VIVID."

THE steam yacht *Vivid*, which was purchased from the Admiralty last year byt he Royal Technical College, Glasgow, for the purpose of training cadets in technical seamanship, has now been put into order for the service. The acquisition of the *Vivid*, it may be recalled, was the outcome of the suggestion made on the occasion of the *Comet* centenary that the principal form which the memorial to Henry Bell should take should be the provision of a suitable steamer for the training in practical navigation of students attending the School of Navigation section of the Technical College. The *Vivid*, which is an iron vessel of 550 tons, is in every way adapted for the purposes in view, being especially equipped with modern appliances for experimental work in nautical science. Through the generosity of Messrs. Mavor & Coulson, electrical engineers, Glasgow, she has just been fitted with an electric light installation. During the winter months the cadets will undergo a theoretical training in the college. In the summer months the vessel will be commissioned for cruising. The term served by cadets will count towards the qualifying period of sea apprenticeship required by the Board of Trade for a certificate as second mate. The *Vivid* it may be stated, is the only sea going steam training ship attached to a school of navigation in this country. She is rigged as a brigantine so that all the seamanship as well as the yard and sail drill of a square-rigged sailing ship can be performed, and practice will thus be afforded in manœuvring a vessel both under steam and sail.

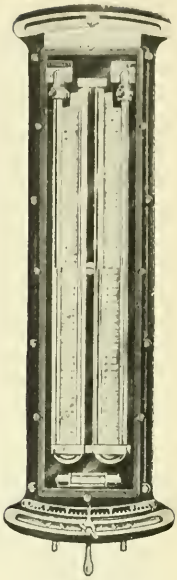
THE McNAB MARINE APPLIANCES

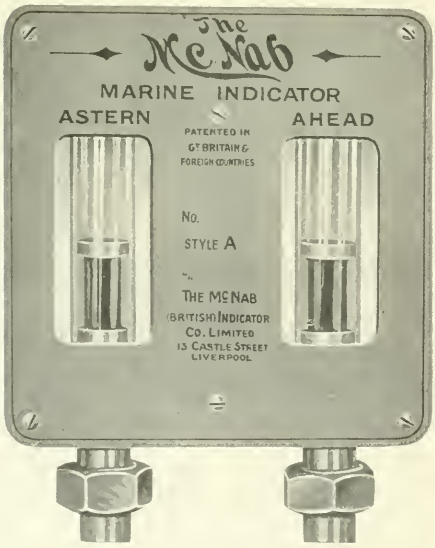
THOUGH improvements have been many and varied in shipwork during the last decades, yet sea-life is in many respects very much as it was in early days. The lead is still heaved, there is the crow's nest for the look out and other small details that have withstood the march of time, but, judging by many indications, even what may be called the minutiæ of a vessel will not be able in the future to elude the searching eye of the inventor. He is everywhere, and tell-tale records have come into the marine world as they have done in many other departments. The owner at home expects to know what has gone on during his ship's voyage, the captain has to be informed what the engines are doing, and if one can save the time of officers and prevent the ship meeting with disaster, a large number of people are being satisfied, and particularly, perhaps, the insurance world. Catering in this direction is the McNab Marine Appliances, Limited, of 23, St. Mary Axe, London, E.C., whose indicator we noticed in these columns in June, 1911. Since that time considerable improvements have been made in this apparatus. While the principle of a pulsating air action still gives the motion to the indicator by which we can tell what the engines are doing and actual speed, and whether going ahead or astern, indicating this in the chart house, on the bridge, or wherever required, it is now possible to register the movements at night-time by a make and break contact, thus affording at all times an indication of the direction of the ship's engines and whether the last order has been obeyed. We are enabled to illustrate the latest form this indicator takes, and when it is considered that simple mechanical action from a moving part of the engines and just an air movement affects the tell tale we have described, it will be seen, we think, that there is here a step in advance. From inspection, we can say that nothing could be simpler or more effective than this device.

Again, every engineer knows his revolution counter is mechanically operated, but with this same system of pulsating air the Company supply a counter that can be placed in any position in the ship, suitable arrangements being made to utilize this pneumatic action by a piston in the counter. The appearance will be seen from our illustration to be like the ordinary counter, and there is nothing to get out of order in any way, a feature which will be likely to commend its use.



Pneumatic Engine Counter.


Draft Gauge, automatically indicates draft fore and aft.



Direction and Revolution Indicator.

Leaving the engine department, we next turn to what has been done for registering the draught of the ship fore and aft; it is not always recognised how important this matter is to a shipowner. An inch wrong in the draught of a vessel may mean a loss of many tons of valuable cargo, and yet we know by the haphazard ways at present in existence, such a mistake is quite possible. McNab's Draught Gauge is designed to avoid all such errors. It is installed in the chart room, or other convenient position, and shows by two distinct readings what the draught is in feet and inches fore and aft, also the degree of list to port or starboard. The working of the arrangement is in reality two small 3-feet tanks of 3 inches diameter, installed in the peaks and connecting to $\frac{1}{2}$-inch sea cocks on the ship's side, and by a small $\frac{5}{16}$-inch pipe from tanks to wherever the gauge is installed. The balance of air and water in the tanks equals the weight of a column of water outside the ship, this weight of water being transmitted to mercury columns on the gauge, thus enabling the readings to be taken in feet and inches as described above.

In Brews Patent Tube Blower, a means is afforded of cleaning the tubes from the smoke box end of the boiler, so that every tube is independently blown out. The action appears to us very rapid and effective. Two immense advantages are that no cutting whatever is required on the Boiler Shell to make

installation, and that the smoke-box doors need never be opened in order to clean the tubes. We also illustrate this blower, and thus any further explanation is rendered unnecessary.

In the Frigidometer this firm has one of the latest instruments by which it is sought to automatically warn the officers of the ship's approach to icebergs. Up to the present there has not been a system for this purpose and now the inventor steps in and endeavours to supply the want. To secure definite results the temperature of the water is taken as low down as possible, where the reading would be lowest, as an iceberg is said to have $\frac{7}{8}$ths of its displacement below the water level, and such a mass will therefore radiate cold in all directions below, but not on the surface of the water. Another means of transmitting is from the temperature of the air, well above the ship's deck, and by this apparatus every atmospheric change is registered automatically; as will be seen from our illustration there is a graduation from 80° to 27° in sea and air temperatures, but any graduation could be made besides this if desired. A special feature is that a bell rings at every drop of temperature and the officer's attention is also called by an illuminated indicator at all times and he has a warning of the ship's approach to danger and opportunity for steering away from it. The McNab Frigidometer was installed in the R.M.S. *Mauretania* eight weeks after the loss of the ill-fated *Titanic* last year, and since that time has been installed on R.M.S. *Baltic*, and also on the Western Union Cable Steamer *Minia*. The instrument has proved itself by practical operation to be a great asset by preventing a vessel

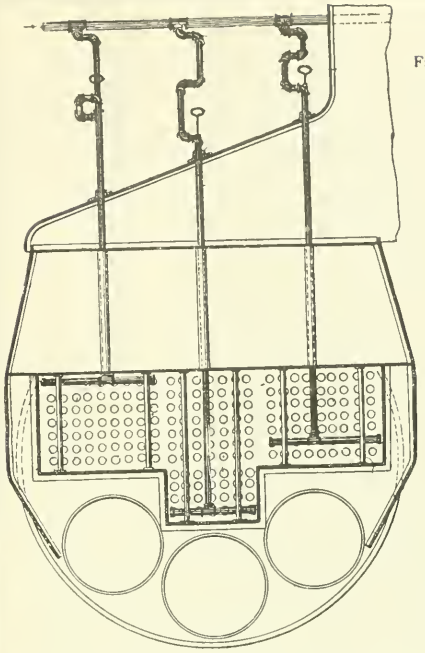
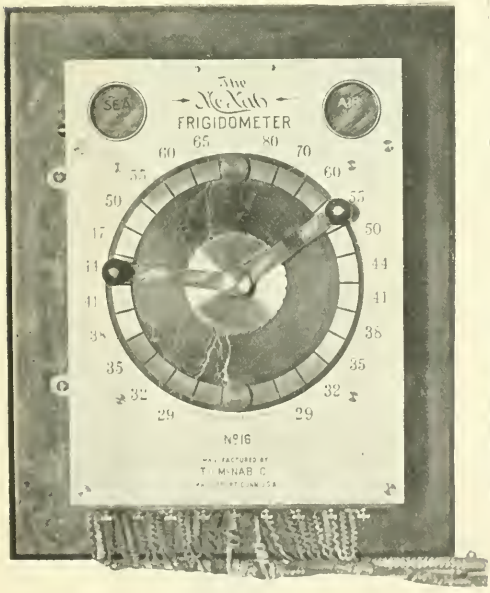


Fig 1

Brew's Boiler Tube Blower

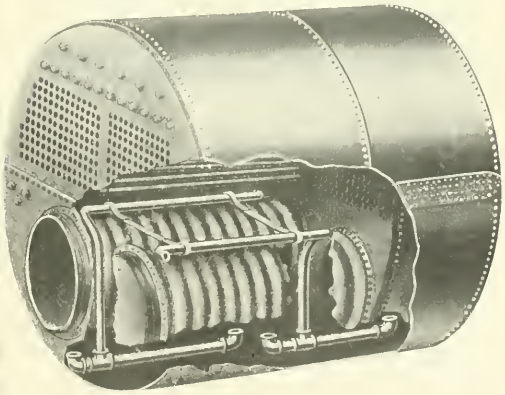


The McNab Frigidometer
A safeguard against ice-berg dangers at sea.

encountering ice at sea by means of the effective warning it gives to the officer of the watch.

Another apparatus we were shown was the McNab Boiler Circulator, which appears to have commendable merits, but it is probable that the lines we have particularly described will have more interest for our readers by reason of the novelty they carry with them.

We were informed that as many as three thousand indicators have been sold in this country and the



The McNab-Eckliff-Automatic Boiler Circulator.

U.S.A. in the last three years and the latest order for these indicators received by this Company is to supply the fleet of destroyers being built at Cowes for the Chilian Navy. As was mentioned at the outset, that there is a demand for checking apparatus on board a vessel there can be no doubt. Labour-saving appliances must come, the day of the rule of thumb has gone, never more to return, and these appliances only tend to demonstrate the truth of the assertion, and show the lines of scientific advance on which we are treading, making it the more necessary for officers to be trained to use such apparatus as here described and in the most efficient manner.

MOTOR VESSEL "FISHER."

This vessel has been built and engined by D. Goedkoop, jr., of Amsterdam, for a Russian owner of fishing boats resident at Astrakan on the White Sea. It is used for carrying fresh fish home from the fleet, thus allowing the fleet to remain on the fishing grounds. A vessel for this purpose must be a good sea boat, able to proceed at a reasonable speed, have good cargo space and an ice-making installation, all these qualities being possessed by the *Fisher*. Her principal dimensions are: Length 59 ft., breadth 12 ft. 5½ in., depth 5 ft. 6 in., draught 3 ft. 3 in., and a speed of 7½ knots can be attained when fully loaded. The general arrangement may be seen from the illustration. The after-peak tank can be used for carrying oil fuel. In the engine room are placed a 38-h.p. Kromhout motor, a generating set for loading the storage battery by which the ship is lighted, driven by the main engine, a connection to the hoisting gear on the main mast, and an ice-making plant. The ship is fitted with two masts, enabling it to proceed under sail alone when required.

The motor is a one-cylinder four-cycle paraffin engine, running at 325 revolutions per minute. The ignition is electro-magnetic, the regulation by a miss and hit arrangement. The cooling water is forced through the cylinder cover by a small centrifugal pump driven by friction from the flywheel. The engine is connected to the propeller shaft by a friction clutch and reversing gear. The mean fuel consumption per h.p hour is three-quarter lbs.

The *Fisher*, which flies the Russian flag, and has its port at Astrakan, made the passage from Holland to St. Petersburg under its own power, encountering very bad weather during the voyage, and it then proved itself to be a good sea boat.

We understand that Messrs. D. Anderson & Son, Ltd., are supplying their "Siderosthen" Solution for the holds of s.s. *Elele*, completing at Messrs. Irvine's Shipbuilding and Dry Docks Co., Ltd., for Messrs. Elder Dempster & Co., Ltd. They have also a large amount of other new work on hand, including s.s. *Queensland Transport*, s.s. *Wearpool* and s.s. *Evangelos*.

THE INSTITUTE OF METALS. The Annual Autumn Meeting of the Institute of Metals will this year, under the Presidency of Professor A. K. Huntington, Assoc. R.S.M., for the first time since the Institute's formation in 1908, be held on the Continent. It will take place in connection with the Ghent International Exhibition, the dates fixed being August 28th, 29th and 30th. Among many important papers to be communicated will be the Report of the Corrosion Committee. Details with regard to travelling arrangements, tickets at special rates, etc., will be announced later.

CARRUTHERS' DUPLEX PUMPS.

The demands made on the ship owner by the travelling public for increased comfort and convenience have rendered the auxiliary machinery on steamships to-day of infinitely greater importance than it used to be.

In no direction is the effect more marked than in the variety and magnitude of the pumping plant of a ship's equipment, and we illustrate below some of the most recent examples of this type of machinery as being fitted now by Messrs. J. H. Carruthers & Co., Limited, of Polmadie, Glasgow, on board the *Aquitania*, *Calgarian*, *Alsatian*, *Empress of Asia* and similar high-class mail steamers. This firm were amongst the earliest makers of the direct-acting steam pump in this country, and for over twenty-five years have made a speciality of all classes of pumping machinery, but more particularly that relating to marine service. In going through their list of designs, as set out in their published catalogue, one is struck with the vast variety of devices which are now available for dealing with liquids under all sorts of conditions.

Fig. 1 is a perspective view of a vertical duplex pump and represents the design recently supplied for the Cunard liner *Aquitania*. These pumps are provided with brass water ends, special brass removable liners and water pistons and bronze pump rods, while the valve gear is of forged steel, the levers and shafts being forged in one piece, and, following the firm's usual practice, adjustable bearings are fitted in

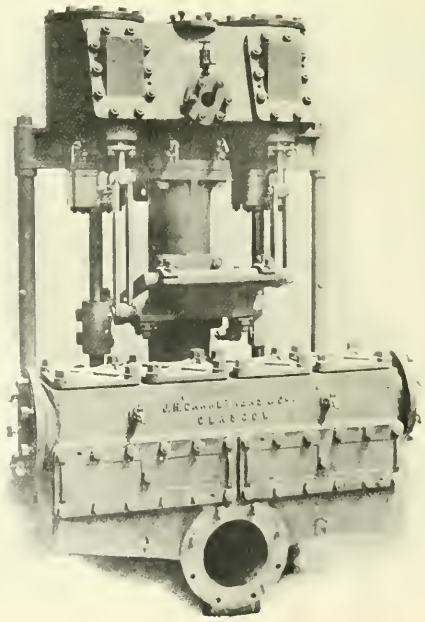
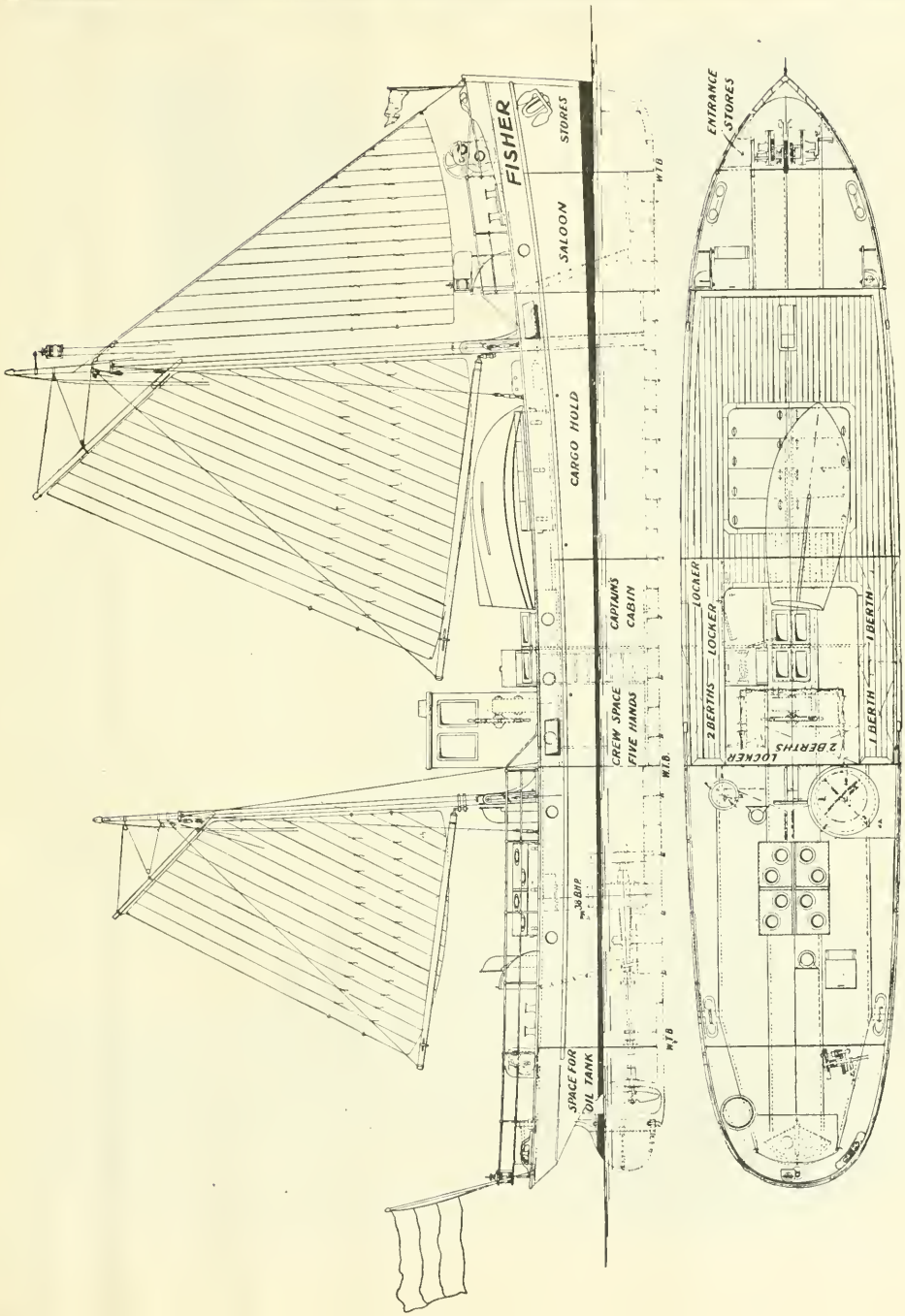


Fig. 1.



General arrangement of Motor Vessel *Fisher*, built and engined by D. Goedkoop, Jr., of Amsterdam.

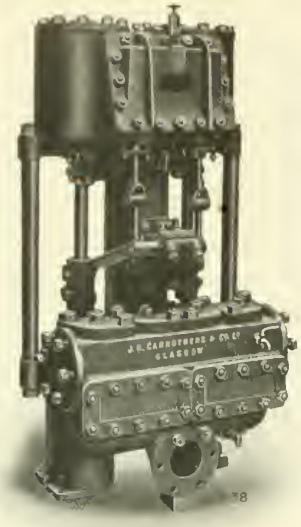


Fig. 2.

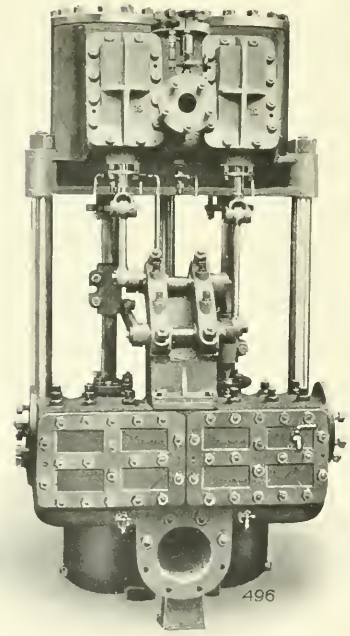


Fig. 3.

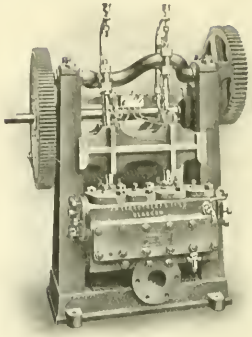


Fig. 4

the wiper brackets. Fig. 2 shows a typical example of a medium sized feed and general service pump. We understand that the firm always maintain a considerable stock of these standard pumps so that early delivery can be given. One design which impressed us very favourably is illustrated in fig. 3. This pump has been specially designed for working See's ash ejector. The framing is of wrot steel and the proportions of the water end such as to provide unusual strength for this very trying service. As showing what is being done to meet the more recent developments in marine engineering, fig. 4 will be of some interest. This is a motor-driven pump, of which a number were recently supplied to a well-known Diesel engined ship, and we understand that several are now in hand for the Admiralty.

Amongst other interesting features in the manufactures of this firm we notice List & Munn's patent gravitation feed water filter and Sands' patent liming tank, but want of space prevents our dealing with these on this occasion.

THE "AVANCE" CRUDE OIL ENGINE.

A short time ago we witnessed the running under test at Dible's yard, Northam, Southampton, of a 16 b.h.p. vertical two-cylinder "Avance" crude oil engine, which is being placed on the market by Messrs. Boving & Co., Ltd., of 9½, Union Court, Old Broad Street, London, E.C.

The motor is of the semi-Diesel type, and as it embodies several special features we think it will be of interest to describe them in detail.

The motor under test was one taken from stock, and had two cylinders, each 174$^{m}/_{m}$ bore, with a stroke of 186$^{m}/_{m}$. The revolutions were 550 per minute. The motor is rated at 16 b.h.p. at these revolutions, and can also be run at 220 revolutions. The fuel used was "Gasoleum," which, we understand, can be obtained from the British Petroleum Co. at 5½d. per gallon. Almost any crude oil product may be utilised for fuel, provided it is free from water, asphaltum, tar or mechanical impurities.

On test the motor developed 22 b.h.p., and for a short period 29 b.h.p. was recorded. When this overload was suddenly released no increase in speed

was observed, the governor acting instantaneously. To start up from "all cold" required about six minutes. When under weigh any cylinder can be cut out if required for the purpose of repair, the remaining cylinder meanwhile developing its full power.

The general design of the motor will be seen from fig. 1, which represents the two-cylinder, non-reversible motor. It will be noted there are no electrical ignition devices and no inlet or exhaust valves. The absence of these make for a very simple engine, and doubtless account, in a great measure, for the wide application enjoyed by this motor.

The motor, which is of substantial design throughout, and is intended to stand up to severe conditions of working, operates on the "two-cycle" system, which will be generally understood. The air for scavenging enters the crank case through a grid containing several small valves protected by a hood. On the down stroke this air is compressed and passes through the piston. There is a port in the piston which at a certain position allows the compressed air to flow out through ports in the cylinder liner, and thus to the combustion chamber. The exhaust port is immediately opposite the inlet port, and to prevent the air travelling directly across the top of the piston and out of the exhaust, the piston is provided with a deflecting lip, which gives the incoming air an upward direction, thus effectively scavenging the cylinder.

There are special water and oil pumps for each cylinder, thus each is an independent unit. The water jacketing has received careful attention, and there is a separate supply for the jacket round the injection valve, thus preventing carbon deposits, and preserving the springs in the injection valve from the effects of excessive temperature.

The ignition is on the "hot bulb" principle, and starting is effected by means of a lamp directed on to the ignition bulb, raising it to the required temperature to ensure the combustion of the incoming oil spray. The lamp is then extinguished and the motor continues to run, as the heat of combustion, together with that generated by the degree of compression employed is sufficient to keep the ignition bulb at the requisite temperature. The flywheel of this size motor is turned by hand at starting, but the larger sizes, from 40 b.h.p. and upwards are started by compressed air.

The engine is governed in a simple manner similar to the "hit and miss" principle familiar to gas engineers. A weight moves backwards and forwards on a tilting arm, which acts on the oil pump. The weight is held by a spring against the governor slide, which is provided with a joggle. When the speed exceeds the normal the weight strikes the joggle and breaks the connection between the governor rod, and the fuel pump rod is missed. The motor, therefore, does not receive any further fuel till the speed is reduced to normal. To stop the motor a lever is provided, which, on being moved, throws the fuel pumps out of action, and the motor stops.

There is no reversing gear fitted to the motor under notice, but the outfit includes a reversible propeller and clutch. This reverse gear is contained in the propeller boss, and as it embodies special features, and is a strong mechanical job, we propose giving details further on.

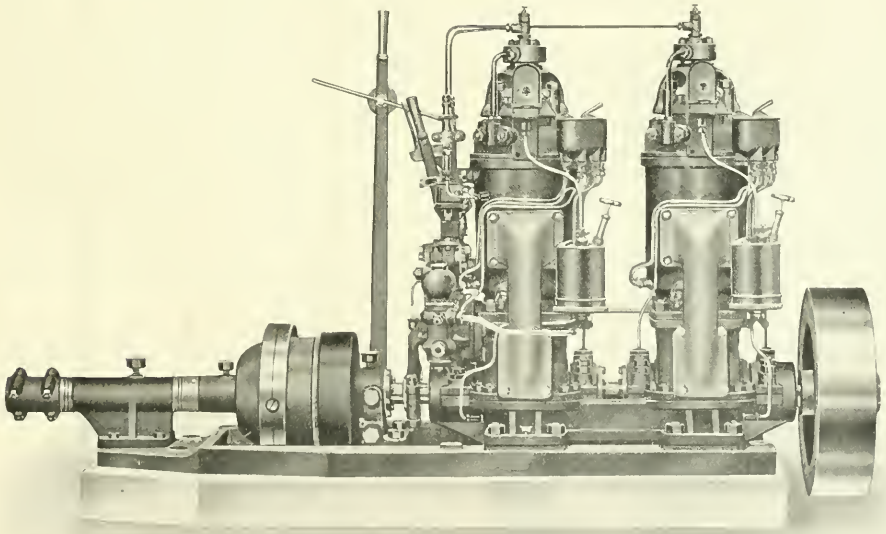


Fig. 1. General design of "Avance" Crude Oil Engine.

Fig. 2 gives details of the direct reversing type engine. The principle underlying it being that it is so arranged as to cause a pre-ignition timed so that the pressure exerted is developed in a contrary direction to that in which the motor was previously running. This is effected in the following manner. On the reversing lever being thrown over the pumps are cut out, and as the supply of fuel is thus cut off the speed falls, simultaneously a distance piece is automatically inserted between the knife edges of the governor and fuel pump rods. The governor eccentric sheave is slotted, which allows it to slip round an amount equal to the thickness of the distance piece, thus causing the point of ignition to be altered, allowing pre-ignition to take place and as previously explained the direction of rotation is reversed, and the ordinary cycle of operations follows.

To avoid overheating and sooty deposits on long overloads, water injection is fitted. By means of the water injection the motor can be adjusted to the temperature most advantageous to the conditions prevailing.

The reversible propeller is shown in Fig. 3, from which it will be observed that the propeller blades are furnished at the root with a long sleeve, which on its outer end is formed into a toothed quadrant. The sleeve is bored to fit a crosshead with two arms, one for each blade. A rod terminating in a U-shaped double rack, the teeth being on the inside and gearing with the quadrant teeth on the blades, is capable of sliding through the central hole in the crosshead, and the outer surfaces are guided in slots in the boss shell. It is therefore apparent that any axial movement of the rack rotates the blades through the necessary angle to cause them to reverse the boat's motion, the direction of rotation of the motor being always the same. This arrangement is specially suited to the needs of fishing boats, as these craft often have to travel very slowly for a considerable time and by setting the propeller blades at the correct angle to give the desired speed, the engine may be kept running at approximately full speed on small fuel consumption, which means the acme of efficiency.

Fig. 3. Reversible Propeller.

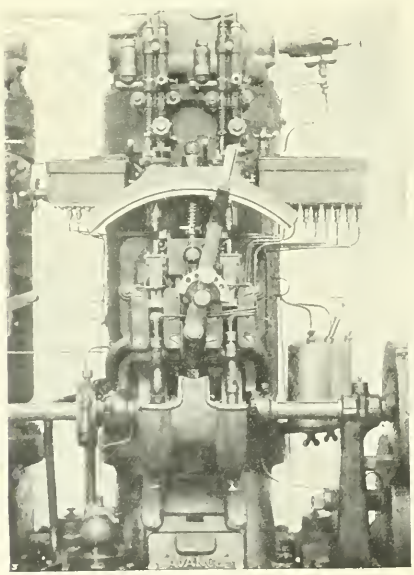


Fig. 2.

Industrial and Trade Notes.

THE CLYDE AND SCOTLAND.

(*From our Own Correspondent.*)

Launches.—Shipbuilding activity in Clyde and East of Scotland yards has not been greatly evidenced by ship launches during May, although two or three notable productions have been sent off the stocks. One of outstanding importance was the dredger *Balari*, launched from the renowned stocks of Messrs. Wm. Simons & Co., Renfrew, which has the notable distinction of being the largest dredger, as regards dimensions, yet built on the Clyde. Another was the P. & O. liner *Nellore* of 7,000 tons, built by Messrs. Caird & Co., Greenock, being the last of four vessels of the "N" class intended for the Company's branch services; and a third was the twin-screw steamer *Gelria*, for the Royal Holland Lloyd, launched by Messrs. Alex. Stephen & Sons, Linthouse, for this Company's service between Amsterdam and South American ports. As recorded in last month's notes, the latter vessel is the first of two similar twin-screw steamers being built and engined by the Linthouse firm, whose length between perpendiculars is 540 ft., breadth moulded 65 ft. 6 in., depth moulded 39 ft., and gross tonnage about 14,200. They will be fitted by the builders with quadruple-expansion reciprocating twin engines of about 11,000 i.h.p., designed to give the vessels a speed of 17 knots at sea.

New Orders.—The placing of new shipbuilding orders has been almost infinitesimal since last report, and in face of the work still on hand, the loss of time on the part of the workmen and the wages demands (which would almost seem to be about to culminate in a general strike and lock-out) this is little to be wondered at. Interest and anticipation, however, are at present centred in the announcement that the Canadian Pacific Railway Co. have now taken in tenders for the building of two more vessels for its Atlantic service. These will be larger than the same Company's steamers *Empress of Britain* and *Empress of Ireland*, and even speedier than the *Empress of Russia* and *Empress of Asia* recently turned out from the Fairfield yard. They will in every way favourably compare with the *Alsatian* and *Calgarian* recently launched, and now undergoing completion, on the Clyde for the Allan Line fleet. The new vessels, it is understood, are to have a sea speed of at least 20 knots, and the specified horse-power of the turbine propelling machinery is 24,000. High hopes are, of course, entertained that at least one of the new vessels will be ordered from a Clyde firm.

The Clyde, perhaps more than any other British district, has learned with interest of the definite placing by the Portuguese Government of a contract for the first instalment of warships required for the reorganization and reconstruction of the Portuguese Navy. The group of naval shipbuilding firms, who elect to be known as the Portuguese Naval Construction Syndicate, consists of Messrs. John Brown & Co., Ltd., Clydebank; The Fairfield Shipbuilding and Engineering Co., Ltd., Govan; Messrs. Cammell, Laird & Co., Ltd., Tranmere Bay; Palmer Shipbuilding and Iron Co., Ltd., Jarrow-on-Tyne; Messrs. John I. Thornycroft & Co., Ltd., Southampton, and the Coventry Ordnance Works, Ltd., Coventry and Scotstoun-on-Clyde. The value of the work which has been ordered is about £1,500,000, which it is proposed to spend upon two cruisers of about 2,500 tons and 20 knots speed; six destroyers of about 850 tons and 32 knots speed; three submersibles of about 350 tons, and a parent ship for submersibles of 850 tons. The submersibles will all be built in Italy by the Fiat Georgio of Spezzia, which concern is also associated with the syndicate, but the precise allocation of the other work is as yet undecided.

Wages Trouble.—Unless the unexpected happens a serious and protracted struggle between shipyard employers and employed is very imminent, and it will be even more acute on the Clyde than elsewhere. For a few months past the Standing Committee of the joint trades on the National Shipyard Agreement has been negotiating for a regulation advance of wages to the extent of 5 per cent. piece rates and 1s. per week (or ½d. per hour) time rates. The employers have refused the advance and asked that the question should stand over for three months in order that it may be made clear whether the falling off in shipbuilding orders is likely to continue or not. The Standing Committee as a result of this decided to take a vote of the various trades on the question of stopping work with a view to enforcing their demand or of agreeing to the employers request for delay. The result of the vote is to be made known about the end of May. Meantime, however, the members of the Amalgamated Society of Carpenters and Joiners, followed by the members of the Boilermakers' Society, have stopped working overtime pending the completion of negotiations, their purpose being, apparently, to leave as much unfinished work as possible in the event of a strike being declared. This policy, it appears, has been adopted on the instructions of the officials of the Societies, and it is general all over the Clyde, both in shipyards and boiler shops, and as concerns repair work as well as new. This policy of rigidly restricting overtime, supplemented by the strike ballots to enforce increase of wages, point to a sharp crisis in the industry shortly. At any rate much will depend upon the result of the ballot being taken and the way in which negotiations may proceed after it is declared about the end of May. Should the men decide to accede to the employers' request for three months' grace the trouble will right itself, for the time being at least, but in the event of the necessary majority voting in favour of a strike there will be time, it is hoped, to enter into fresh negotiations before extreme measures are taken.

Ship Repairing Work.—The amount of ship repair and overhaul on the Clyde has now slackened off and the completion of alterations and repairs to North Atlantic liners renewing their service after the opening, about a month ago, of the St. Lawrence season. One of the last vessels to be put through overhaul was the Allan liner *Hesperian*, the work being done by Messrs. Alex. Stephen & Sons, of Govan Graving Dock Works. Messrs. Barclay, Curle & Co., Ltd., are completing an extensive overhaul of the Clan liner *Clan Chisholm*, the engines and boilers having had to be removed, to renew inner bottom plating. Interest in ship repair work on the Clyde was somewhat quickened recently through the towage up the river and the placing on Messrs. A. & J. Inglis' patent slipway of the well-known Clyde passenger turbine steamer *Atalanta*, which on May 8th, through a temporary hitch in her machinery, was driven by a strong wind on to the shore of the Island of Arran near Whiting Bay. She was floated after lying high and dry for several tides on a pebbly shore, and the damage to her hull was found to be very considerable. The repairs necessary will probably entail the removal of her turbine engines. The *Atalanta* was built several years ago for the Glasgow and South-Western Railway Co., by Messrs. John Brown & Co., Ltd., Clydebank, and the turbine machinery fitted consisted of the experimental set made by the firm to guide them in producing the turbines for the *Carmania*.

Warship Speed Trials.—During May the measured mile at Skelmorlie and the stretches of the Firth of Clyde generally have been requisitioned by naval as well as mercantile ships for their speed and other trials. H.M.S. *Ambuscade*, a new torpedo-boat destroyer, built by Messrs. John Brown & Co., Clydebank, and the *Hardy*, a destroyer from the stocks of Messrs. John I. Thornycroft & Co., were amongst the naval vessels put through a series of high-speed runs. More notable than these, however, was the presence on the Firth of the Japanese battle-cruiser *Kongo*, which was launched on May 18th last year by Messrs. Vickers, Ltd. (see North-West notes).

Messrs. Harland & Wolff, Ltd., have now under way in their Govan yard, amongst other important work, a 15,000 ton mail and passenger steamship for the Pacific Steam Navigation Co.'s service between Southampton and South America. The new vessel is almost 600 ft. in length and will be propelled by triple screws driven by combination reciprocating turbine engines of sufficient power for a high rate of speed. She is to be named *Alcantara*, and a sister ship the *Andes* was launched on May 8th from the Belfast yard of the firm, while a third sister vessel is on the stocks there.

Messrs. William Simons & Co., Ltd., Renfrew, have amongst other work on hand at present a fleet of as many as eight dredging vessels to Russian account, intended for service in connection with the construction of the new naval port at Reval. The first item of the important contract, a 700-ton hopper steamer, was launched from the firm's stocks on May 9th, having all machinery on board and with steam up, ready for trials. The vessel is propelled by compound surface-condensing engines, supplied with steam from steel horizontal multitubular boilers constructed for a working pressure of 120 lbs. per square in. Powerful steam gear is provided for rapidly raising and closing the hopper doors. For the year ending March 31st last this Renfrew firm have recommended, in addition to the dividend on the preference shares at the fixed rate, payment of a dividend of 10 per cent. and a bonus of 10s. per share on the ordinary shares, after making full provision for depreciation and adding to the general reserve fund.

Messrs. Mackie & Thomson, whose shipbuilding activities will shortly be transferred from Govan to Irvine, on the Ayrshire coast, have submitted plans of a number of the new workshops they propose erecting in connection with the new shipyard being prepared for them. These will entail an outlay of between £6,000 and £7,000 and the plans have been approved by the Town Council and harbour authorities. The Harbour Trust are about to enter upon a scheme of deepening the port by dredging, and have recently appointed Mr. George Coward, of Middlesbrough, to the position of dredging master.

The Ailsa Shipbuilding Co., of Troon and Ayr, continue to be fully employed at both their establishments. The first of two screw steamers they are building at Troon to the order of Messrs. Duncan, Fox & Co., London, for Cia Argentine de Navigation a la Patagonia, for passenger service between Buenos Ayres and Punta Arenas, was launched on May 8th. Engines of the triple-expansion type will be supplied by the builders and drive the vessel at a speed of 12 knots. On May 15th they launched from the Ayr yard the screw tug steamer *Tritao*, built to the order of Messrs. John M. Campbell and Son, Glasgow, for foreign clients. She was towed to Glasgow, where she is being fitted with propelling machinery by Messrs. McKie & Baxter, of Copland Road Engine Works, Govan.

The Caledon Shipbuilding Co., Dundee, have received an order from the Clyde Shipping Co., Glasgow, to build and engine a steel screw steamer of 270 ft. in length and of 14½ knots speed for the owner's special trade between Liverpool and Waterford.

The Montrose Shipbuilding Co., Montrose, whose yard was reopened about nine months ago, after having been closed for some time, are reported to contemplate transferring their business to Bo'ness on the Firth, where new works will be laid down on the estate of Carriden. This estate in its entirety has been purchased by Mr. Joseph Constant, the well-known London shipowner, who has all along been interested in the Montrose yard, ably managed by Mr. John Fletcher. The Carriden estate, extending to 737 acres, is opposite the Rosyth naval base and was bought by Mr. Constant for £20,000.

Messrs. Hall, Russell & Co., Aberdeen, who launched in April the screw steamer *South Bulli*, built to the order of the Bellambi Coal Co., Sydney, on May 8th launched a sister ship, the *Wonona*, for the same Company. The vessels are 204 ft. in length and are specially constructed for the coal trade.

TEES AND THE HARTLEPOOLS.

(*From our Own Correspondent.*)

Middlesbrough.

Messrs. W. Harkess & Son, Ltd., continue to be very busy on both old and new work. They expect to secure the order for a small sized steamer that is in the market; nothing new is reported during the month.

Messrs. Sir Raylton Dixon & Co., Cleveland Dockyard, have plenty of new work and are reported as being likely to secure an order for a large cargo steamer for Liverpool owners.

Messrs. Richardsons, Westgarth & Co., Ltd., have several large contracts for marine work on hand, nearly all for early delivery. Their branch establishment the Heavy Stampings, Ltd., have a large amount of work on hand, especially for motor work.

Messrs. Smith's Dry Dock Co., South Bank, are very full up with both new and old work. Great extensions are being made to enable them to cope with larger work, *viz.*, vessels up to about 300 ft. long.

Stockton and Thornaby.

Messrs. Craig, Taylor & Co. have a large amount of work on hand, and are expecting to secure an order for a medium-sized cargo steamer that is in the market. They have just secured the contract from Messrs. Lane & Macandrew, London, to build an oil tank steamer of about 8,000 tons deadweight on the Isherwood principle, for the Anglo-Saxon Petroleum Co. with engines by the North-Eastern Marine Co., Sunderland, for delivery in March, 1914. They have a sufficient amount of work on hand to keep them busy well into next year.

Messrs. Richardson, Duck & Co. continue to be as busy as ever. Although enquiries are falling off they have a large amount of work on hand, sufficient to carry them through the year.

Messrs. R. Ropner & Son are reported to have secured the contract to build a cargo steamer for foreign account, which will keep them busy for over the year.

Messrs. Blair & Co. have a very large amount of work on hand, principally for locally-built steamers and a few building on the Wear. All departments being very well occupied.

West Hartlepool.

Messrs. Furness, Withy & Co., Ltd., are reported as having contracts with Messrs. Pickersgill & Son, Sunderland, for two 8,000 deadweight steamers, to be engined at the Scotia Engine Works of Messrs. Richardsons, Westgarth & Co., Sunderland. They have sold the s.s. *Avala*, 3,755 gross tons, to foreigners and bought the s.s. *Togston*, 1,057 gross tons, from Brownhill Collieries, Ltd., Newcastle-on-Tyne. Messrs. R. Livingstone & Co. have sold their s.s. *Axminster*, 1,905 gross tons, for about £10,500. The s.s. *Freida*, 2,072 gross tons, belonging to the Trechman Steamship Co. (Messrs. Trechman Bros., managers), has been sold to Scandinavian owners through Messrs. T. Pinkney & Son. The Imperial Steamship Co. (Messrs. Sivewright, Bacon & Co., managers), West Hartlepool and Manchester, have sold the s.s. *Gladestry*, 2,360 gross tons, to Japanese owners through Messrs. C. G. Ashlin & Co., for £14,000.

Messrs. W. Gray & Co., Ltd., continue to be very busy, new orders are reported and both yards of this firm are taxed to their utmost capacity. A record output is expected by this firm.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Ltd., Harbour Dockyard, continue to be very busy on both old and new work. Amongst the new orders reported is a third duplicate steamer to be laid down on the ways just vacated by the s.s. *Garron Head* for the Head Line of Belfast.

The Central Marine Engine Works of Messrs. W. Gray and Co. have orders to build the engine and boilers for the new vessels to be built by this firm; they are also very busy in their stamping department.

Hartlepool.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Middleton Yard, are reported as having secured the order for a large cargo steamer for Liverpool owners, which will keep them very busy well into next year.

Messrs. Richardsons, Westgarth & Co. are busy in all departments; amongst the new orders is the machinery for a third steamer of about 3,500 deadweight and 900 i.h.p., to be built for the Head Line of Belfast. They are also busy with a set of engines and boilers for the Eastern Telegraph Co., London, the vessel for which is being built by the Goole Shipbuilding Co.

THE HUMBER AND DISTRICT.

(*From our Own Correspondent.*)

Trade of the Empire: Australia and Hull. The Premier of Victoria (the Hon. W. A. Watt, M.L.A.), and the Hon. Donald McKinnon, M.L.A., a member of the Government of Victoria, were Hull's Australian visitors on April 29th. The gentlemen were taken over the same ground as the Premier of South Australia (the Hon. A. H. Peake) and the Hon. L. O. Loughlin (Speaker of the House of Assembly), on April 15th. There was a large and representative commercial gathering at the luncheon given at the Royal Station Hotel by Oswald Sanderson, Esq., chairman of the Chamber of Commerce. Mr. Sanderson extended a cordial welcome to the distinguished guests and spoke of the port of Hull as a distributing centre for Australian goods for the Midlands and northern towns. He said Hull was the third seaport of the United Kingdom, and they had a vast system of transhipment facilities to the principal countries of Europe and America. They were able to deal quickly and economically with foods. They had an enormous trade with foreign ports and by virtue of their regular steamship service, efficiently maintained, they were in a position to distribute produce to Russia, Germany, France and elsewhere, and to the interior of England, in a way which few, if any, other ports in England could rival. The Premier in his reply, said he had seen many interesting things at Hull, particularly the enterprise and public spirit of the big organizations. He must acknowledge the enterprise in connection with the great joint docks which were to be added to the facilities of the port already possessed. Both the railway and the dock facilities showed they were a bustling people, who were not satisfied with things as they were, but wanted to make them better. He would like to see a similar spirit existing all over England. The Hon. D. McKinnon also stated his appreciation of the enterprise of Hull in a very breezy speech. The health of the host (Mr. Sanderson) was enthusiastically drunk on the invitation of the Premier. The party were met at the Exchange in Longate by the president, Mr. Dumoulin, where a very cordial welcome was extended to the visitors. They next visited the Pacific Club, where they were received by the president, Mr. W. H. Carr, who remarked that they were standing where Australian wheat was sold, and last year they sold about 350,000 quarters, and the quality was spoken of as the best the world produced.

New Joint Dock.—The statement made by C. E. Thielmann, Esq., president of the Hull Corn Trade Association, at their annual meeting, that the new Joint Dock will be open for traffic before the end of the present year, confirms the hopes that have been entertained for some time. The construction of the dock is practically completed and, in fact, is so far advanced that water will be let in in July, from which date preparations may go ahead for the formal opening. It is unfortunate, perhaps, that the magnificent grain silo now being built will not be ready before 1915. Nearly all the berth space has been booked.

The two graving docks now under construction and about finishing on the Joint Dock have been leased to Smith's Dock Co., Ltd., of the Tyne and Middlesbrough, for a period of 99 years. This firm have to spend a large amount of money in bringing the dry docks up-to-date, for dealing with the work thereon. The ship repairers of the port are to be allowed on the docks of this firm, to quote against them for repairs to Hull work, etc., which will be a great incentive to the outside firms to compete when asked to do so by shipowners.

Fish Dock or St. Andrew's Dock.—The engineering and boilermakers works, boat builders and mast and block makers

are fully employed with repair work and opening out boilers and machinery for Lloyd's surveys. The patent slips on the dock belonging to the North-Eastern Railway Co. are fully employed and well booked up. Several trawlers are undergoing extensive repairs, after being ashore on the islands at Iceland. There is a great amount of new tonnage building in the local yards for Hull owners to replace trawlers that have been sold and lost vessels.

Obituary.—The interment of the late Mr. J. Tomilson, a Hull Board of Trade inspector, attached to the outdoor staff of the mercantile office, took place on April 28th. Mr. Tomilson, who died suddenly under sad circumstances, was a familiar figure in Hull, and had a long connection with shipping. He was well known and respected by all engineers. There was a large gathering at the cemetery and many floral tributes were sent.

Messrs. Amos & Smith are fully employed in all departments with new and repair work, and are still booking new orders for engines and boilers for trawlers, coasters, etc. The branch works at Alexandra Dock keep fully employed with general repairs to vessels in graving dock work, also overhauling machinery and opening out for surveys, etc., besides dock repairs.

Messrs. Cooper & Co., Ltd., are very busy with repairs on the different steamers in the docks, and the moulding and boiler shops and engine works are kept fully employed. The company has been fortunate in securing a number of orders for their patent propellers. The branch shop at Alexandra Dock has also had a good share of repair work. The Company has had to refuse work from owners, as they could not secure the large railway docks, and steamers have gone to other ports, as the Hull graving docks were booked up.

Messrs. C. D. Holmes & Co., Ltd.—The past month for this firm has been a very busy one. Six new trawlers have received engines and boilers and been sent on their trial trips. The firm are still booking orders for engines and boilers for coasters, trawlers and tug boats, besides fitting new boilers to old steamers and doing the necessary general repairs, deck, etc. Orders for large trawl winches from different parts of the country are being secured. The branch works at Alexandra Dock are securing work on the different outside steamers coming to the port.

Messrs. North-East Coast Engineering Works (Hull), Ltd., have had a fairly busy month on the following steamers—the R.M.S. *Potaro*, built a new steel house on quarter-deck for isolation purposes, fitted up internally with up-to-date appliances for sick passengers, also work in the engine-room and deck, and extensive repairs to passenger accommodation; s.s. *Afghan Prince*, dry docked and shaft drawn and new propeller fitted, also extenive repairs executed; s.s. *Carlton*, s.s. *Amberton*, general repairs both engine-room and on deck; s.s. *Menes*, dry-docked and extensive repairs executed to the bunkers and general deck repairs. This steamer has been sold out of the Moss Line of Liverpool to Italian owners.

Messrs. Earle's Shipbuilding and Engineering Co., Ltd.—This yard is exceedingly busy with new vessels building, and their patent slips are kept fully employed, in some cases doing some very extensive repairs. The outside repairing departments are kept likewise fully employed in the docks. The Company has just launched a fairly large steamer *Sagoland*, to the order of the Angfartygs Aktiebolaget Tirfing of Gothenburg, the managers of the Company being Messrs. Axel Brostrom & Sons. The vessel is intended for their iron ore, grain and general trades, and is described in the Launch section of this journal.

Messrs. Woodall & Co.—This firm have had a fairly good month in general repairs among the steamers in the docks, more especially amongst the coasting steamers, and have also had a big demand for their patent derrick and cargo blocks for new steamers building throughout the shipyards of the country. The smiths' shop is fully employed in forgings for the different railway companies, and also forgings for small shipyards, such as stems and stern-posts.

Messrs. Cochrane & Sons, Ltd.—This firm are still booking orders for trawlers, coasters and tugs and barges for different clients throughout the country, and have sufficient work in hand to keep them at full pressure this year. They have several trawlers fitting out at Hull docks now with machinery and boilers, by the well-known engine works of Messrs. C. D. Holmes, Ltd., and Amos & Smith.

Messrs. Stewart & Craig have had extensive repairs on the s.s. *Rodney* in deck and engine-room; s.s. *Anniersle*, a number of shell plates, renewals and other extensive repairs in engine-room and deck; in addition numerous steamers in the Fish Dock have undergone repairs by this firm and they have several ships booked for repairs on arrival at this port.

THAMES.

(*From our Own Correspondent.*)

Royal Mail Steamship Co.—This Company's report refers to the continuous increase of business during the past year. After providing for depreciation and other charges, the profits for 1912 amount to £481,539, making a total credit of £498,294, with what is brought in, which, after reserve and various funds are provided for, allows of a dividend on the ordinary stock of 6 per cent., against 5 per cent. for the previous year. Orders have been placed with Messrs. Workman, Clark & Co. for two trans-Atlantic mail boats for the West Indian service, and with the Caledon Shipbuilding Co. for two coastal vessels for carrying mails between Trinidad and Tobago. A new steamer is also being built by Messrs. Harland & Wolff for the South American mail service, to be named the *Alcantara*. Mention is made of the purchase of the Nelson Line's fleet of seventeen steamers, with an aggregate tonnage of 43,389, thus making with associated lines a total of 1,611,327 tons after completion of the Nelson agreement. It was also reported that the Shire Line to the Far East will be extended across the Pacific to ports of the west coast of North America, and arrangements have been made with Messrs. Workman, Clark & Co. for the construction of two vessels of large carrying capacity for this trade. The Company in their South American service are making a departure in the autumn by commencing to run express boats to Rio Janeiro and Buenos Ayres. The *Arlanza* is one of the vessels set aside for this service and is at present the finest boat in the Company's fleet. Another similar vessel, the *Andes*, has just been launched.

The British India Co.—This Company have just had their new vessel, the *Malda*, launched from the yard of Messrs. Barclay, Curle & Co., for their London and Calcutta service. This boat is 450 ft. long, 58 ft. beam and 11,000 tons cargo capacity. On the measured mile she attained a speed of 13¼ knots. The *Malda* is the first of a number of her class under construction at this yard, and at Messrs. Swan, Hunter and Wigham Richardson's, and intended for the London and Indian service and also to Durban. This Company is the largest British steamship line under one flag. At the date of the annual report there were 113 vessels and last year a million and a quarter passengers were carried by them without loss of life. It would seem that at an early date the company will possess 136 boats, including five acquired from Messrs. Archibald Currie & Co., who have been running a line from India to Australia for very many years. The Company distribute 10 per cent. on the ordinary shares, which is 2½ more than for the previous year.

Australian Steamers.—There have been two recent vessels for this particular service built or building. One is the triple-screw steamer the *Katoomba*, 466 ft. long by 60 ft. beam, launched recently at Belfast for Messrs. McIlwraith, McEacharn & Co., for their coast service. Another vessel named the *Euripides* is for Messrs. G. Thompson & Co., the Aberdeen line. This vessel will carry 1,100 third-class and 150 first-class passengers *via* the Cape. Both these vessels are driven by triple-expansion engines for the outer propellers and a low-pressure turbine for the centre one.

Thames Ironworks.—Two of the properties of this Company, *viz.*, the engine works at Greenwich, comprising nine acres, and the boiler works at Deptford, having an area of 5,000 square yards, have been offered at auction, but there was no bid for either of them. The works at Canning Town were not offered, as a provisional contract, it was understood, had been entered into for its disposal.

Port of London Improvement.—An improvement in connection with the dry docking facilities of the port has been completed at Millwall Dock. The graving dock there has been lengthened from 450 ft. to 550 ft. This is only one instance, pending new constructions, in which existing structures are being improved and which, of course, will be a great advantage to shipping using the port.

Trinity House.—The Elder Brethren, with the Duke of Connaught as Master, recently entertained at dinner at their house on Tower Hill, the Prince Arthur, Prince Louis of Battenberg, the Lord Mayor, the Prime Minister, the Marquis of Bristol, Lord Waldegrave, Right Hon. A. J. Balfour, Right Hon. Winston Churchill, Sir Edwd. Beauchamp (chairman of Lloyd's), Sir Thos. Sutherland and other ministers and officers of various positions.

SOUTH OF ENGLAND AND THE ISLE OF WIGHT.

(*From our Own Correspondent.*)

Southampton.—The *Imperator's* maiden voyage, which was advertised to commence on the 25th of last month from Southampton, was postponed, and the ship will not appear in local waters till the 12th of the present month. This alteration is partly due to the volume of work requiring completion and to the accident whilst she was at Hamburg. It has caused a rearrangement of the Company's time-table, and as a consequence the 25th of May sailing was taken by the *Cleveland*, and her place on the Boston service by the *Blucher*. This month's sailing on the 12th was originally assigned to the *Kaiserin Auguste Victoria*. She will now take the sailing on the 19th inst. The *Cleveland* did not arrive here till the 10th May on the completion of her world tour and at the time of going to press was being rapidly prepared to take the sailing originally assigned to the *Imperator*.

Last month considerable anxiety was caused here by the report that one of the Union Castle Co.'s steamers was ashore at Cape Blanco. It was assumed for some time that it was the *Kenilworth Castle*. Considerable time elapsed before a definite announcement could be made by the Company, meantime the anxiety increased. The Company announced their deep regret at the anxiety caused, and issued a notice that their captains who knew the coast reported that the wreck of a French cruiser lies exactly at the spot mentioned by the rumour, and that possibly the captain who reported the wreck had assumed that what he saw was a vessel belonging to the Union Castle Co., not knowing of the old wreck. This has since proved to be the solution, much to the relief of local relatives of the crew.

Southampton Labour Troubles.—At the time of writing the engineers' strike had entered on its ninth week and no immediate prospect of a settlement appeared likely. Over 1,000 men are affected. Several meetings with the Employers' Association have taken place since last month's notes appeared, and the men have now been offered 1s. 6d. per week all round on both new and repair work. Previously this offer only applied to repair work and 1s. was offered for new work. The men demand an increase of 3s. per week, in view of the increased cost of living. The General Federation of Trades Unions stopped financial support to the strikers last week. The Building Trades Committee has been successful in securing increased rates of pay to men in that branch of trade, the arbitrator finding in favour of the men, who benefit to the extent of 1d. per hour, in the case of bricklayers whose rate is now 9¾d. per hour and in the case of labourers the rate is now 6¼d. per hour, an increase of 4s. 5d. per week in each case. Several other trades were awarded an advance of ¼d. per hour.

Messrs. J. I. Thornycroft & Co., Ltd., Woolston Works, Southampton. Work is proceeding on the six torpedo-boat destroyers for the Admiralty. H.M. paddle tug *Stemmous* carried out successful trials last month, and afterwards the machinery was opened up for inspection. She will shortly be handed over to the Admiralty. Good progress is being made on the Diesel-engined yacht, and on the s.s. *St. Patrick*, the passenger and cargo steamer for Trinidad. The *El Lobito*, a composite cargo vessel for Peru completed successful trials, and was handed over to the owners last month. The firm are busy with the lightships for Trinity House, and with the Canadian Customs Cruiser *Margaret*. The Repairs' Department have been occupied with work on various yachts, liners, troopships and dredgers.

Messrs. J. Samuel White & Co., Ltd., East Cowes, Isle of Wight.—On the 6th of last month H.M. ocean-going destroyer *Redgauntlet* was successfully launched from this yard. She is one of the 1912-13 programme (*Rob Roy* class). She is the first vessel of her class to be launched, and is fitted with turbines of the "Parsons" type and "White Forster" water tube boilers burning oil.

THE BRISTOL CHANNEL.

(*From our own Correspondent.*)

Cardiff and Barry.

Cardiff and Barry.—Since last month's notes were penned the quantity of tonnage visiting the wet docks continued fairly good, despite the inclement weather towards the end of the month. The pressure on the dry docks and ship-repairing establishments has decreased slightly, but, notwithstanding, most of the docks were well employed and continue to have a large amount of work booked on future arrivals. Up till the stoppage of work in the docks for the Whitsuntide holidays there was marked activity in getting vessels ready for sea, as owners naturally do their utmost to effect the clearing of their ships before the period of enforced idleness due to the holiday season takes effect. Owing to the amount of repair work in the district there is still a difficulty in securing workmen for new construction work, as men prefer repair jobs to ship construction, owing to the fact that more money is obtained through the former.

Mountstuart Dry Docks, Ltd.—The exceptional activity of this firm referred to last month has been well maintained right up-to-date. A large number of vessels have been dry-docked, including two large twin-screw steamers, the *Aparima*, belonging to New Zealand, and the *Kansan*, of New York, the latter vessel having a heavy machinery overhaul. The No. 1 dock has been engaged by the s.s. *Frankby*, of Liverpool, with extensive damage to bottom plating, floors, etc., also heavy weather damage.

The Channel Dry Dock Co. put a number of vessels through their hands, but none of the jobs call for special comment.

The Repairing Establishments of Messrs. T. Diamond and Co., Messrs. Shearman & Co., Messrs. Elliot & Jeffrey, and Hill's Dry Dock Co. were responsible for a substantial amount of completed work. The large four-masted Greek steamer *Othon Stathatos*, arrived here from Padstow, where she was beached after collision, and has been repaired in the Junction Dry Dock.

Barry continues to attract a good amount of repair work, the Graving Dock Co. in particular being well booked up. Messrs. C. H. Bailey have also been well engaged on ship work during the month.

New Motor Barges.—The second motor barge under construction by the Mountstuart Dry Docks, Ltd., for Messrs. Spillers & Bakers, Ltd., is rapidly nearing completion. These barges have been designed with a view to dealing more effectively with the transport of grain through the docks to their owners' mills. Their dimensions are—length 75 ft., beam 14 ft., depth 7 ft. They are constructed entirely of steel and are fitted with a Kromhout single-cylinder paraffin motor, 9 in. diam. by 9½ in. stroke by 22 b.h.p., with hot combustion-chamber ignition. The propeller is of the three-bladed fixed type, the engine having a reversible clutch, and all the necessary controls are fitted on deck. The speed loaded is 6 miles per hour, and each barge is designed to tow five dumb barges with about a hundred tons in each. The limited beam measurement has been compulsory owing to the narrow passages to be negotiated in getting through the older docks.

Visit of New Zealand Steamer.—There is at present in dock the twin-screw steamer *Aparima*, belonging to that old-established and progressive concern, the Union Steamship Co. of New Zealand, and being their largest cargo carrier. Her owners were the first in the Southern Hemisphere to introduce the turbine system of steamship propulsion.

British Buyers for German Steamers.—A report is current here that an important London passenger line is negotiating for the purchase of the three German passenger steamers *Kunz*, *Goetz* and *Heinz*, which have occupied quarters in the docks here for many weeks past.

Passenger Steamer for Portugal.—The well-known Bristol Channel pleasure steamer *Westonia* has been disposed of to Portuguese buyers. This steamer possesses the unusual distinction of now assuming her sixth name since she first entered on service.

Swansea and Port Talbot.

Dry dock and ship-repairing work in this district has been rather quiet during the month.

The tin-plate trade is passing through a period of great depression, and at the present time close on 100 mills are shut down. A variety of causes have operated in bringing the industry into this unfortunate position. About three years ago there was an abnormal demand for tin plates, which necessitated work at high pressure to cope with the demand. As a result about fifty new mills were erected and when the transitory boom collapsed, the supply soon exceeded the demand. Another cause of the depression is the fact that the price of steel bars, which form the raw material for the tin-plate works, was advanced during the boom, and as the price of tin plates had to be correspondingly raised it became more difficult for the Welsh firms to compete with the American firms.

New Departure in Coal Loading. The Port Talbot dock authorities are making determined endeavours to attract increased tonnage to their docks. The extensions to the latter are now practically completed, and the latest form of enticement is the erection of some coal-shipping plant of a different type from that at present common to Bristol Channel ports. It is arranged for the shipment of coals at a high rate of speed by means of conveyor belts, a system which has already been operated with success in coal ports in other parts of the country.

MERSEY AND MANCHESTER SHIP CANAL.

(*From our own correspondent*)

Messrs. Cammell, Laird & Co.—The *Kristianiafjord*, the first of two vessels being built by the firm for the Norske Americalinje Company, ran a highly successful sea-trial on May 10th off the Port of Liverpool. It is intended that the official trials will be carried out on the Clyde towards the end of May, the vessel taking up her first sailing from Christiania on June 4th for New York, calling at Christiansand, Stavanger and Bergen. The second vessel is expected to take up her sailings in September, when a three-weekly service will be inaugurated, which it is expected will command the New York traffic from Norway, Sweden and the adjoining countries. At present, the emigrants from these countries have to cross the North Sea to the Tyne or Humber and thence to Liverpool, there joining the Atlantic liners. This entails a complete passage of 9½ to 12 days, according to the Atlantic steamer available. The new service will accomplish the journey in 9½ days, thus giving the passengers a journey involving much more comfort. The "Storthing" have voted a subsidy of £27,780 per annum from the time the service starts until June, 1915. Amongst many special features may be mentioned the fitting of Welin davits operating the "Boats for all" carried, also Thermo tank system of heating and ventilating. The *en suite* staterooms comprise dayroom, bedroom, bathroom and lavatory, all the equipment being of the highest standard of excellence. Mr. F. O. John, until recently head ship draughtsman at the Jarrow yard of Palmers' Shipbuilding and Iron Company, has accepted a similar position with Messrs. Cammell, Laird & Co., Birkenhead. Mr. John received his training at Barrow before going to Messrs. Palmers some 2½ years ago, and is an associate member of the Institution of Civil Engineers and Institution of Naval Architects. Mr. Arthur D. Wedgewood, managing director of Messrs. Cammell, Laird & Co., at Sheffield, will retire in August next. Mr. Leonard Munns, secretary of the Company, and Mr. Albert Good have been elected local directors.

Messrs. H. & C. Grayson.—This firm have been well employed at their various yards. The Isle of Man's Company steamers *Mona Queen* and *Queen Victoria* have had extensive overhaul preparatory to the season's work. The Great Western steamers *Ibex* and *Great Southern* have had their annual overhaul, while the *Scandinavia* has had new oil engines fitted. The Belfast steamer *Graphic* and the Morecambe steamer *Isle of Bute* have been through their B. O. T. Survey. On the slipways they have a steamer for coast traffic, also several barges for grain elevators. At their Wallasey Dock the steamers *Drogheda* and *Enid* are having considerable work carried out.

Messrs. Clover, Clayton & Co.—Mr. S. C. Oldham has recently been appointed shipyard manager at the extensive Birkenhead yard of Messrs. Clover, Clayton & Co. (See page 427).

The Birkenhead Ferries.—In view of the great importance attaching to the transport between the two cities, the goods traffic having recently increased 25 per cent. due partly to the Irish cattle trade, it was decided at a meeting of this committee on May 7th to request Prof. Abell of Liverpool University to consider the most suitable design for a new ferry steamer and to report thereon.

The Birkenhead Docks.—On April 23rd, a serious fire broke out in the early morning in the warehouses on the North side of the Morpeth Dock. Damage to the extent of £7,000 was done, due, it is thought, to spontaneous combustion in the esparto grass stored in the warehouse. The Clan liner *Clan Maclean* was slightly damaged before she could be moved out of danger.

The Liscard Sea Training Homes. The new additions to these homes are now complete and await the formal opening on July 1st. These are known as the Heath Harrison Instruction Wing and the Sir Alfred Jones Memorial Homes and are to be jointly opened by Lord Inverclyde and Mrs. Pinnock, sister to the late Sir Alfred Jones. The national aspect of these homes will be conceded when it is remembered that professions are found for boys who would otherwise be a burden to the ratepayers. These boys are passed into the Admiralty at a stage of proficiency which would otherwise cost the rates £46. For this the house receives a grant for each boy of £25, out of which the boys' travelling expenses are paid.

The Liverpool Salvage Association.—Continual additions and improvements are being added to the up-to-date plant owned by this Company. Interesting experiments were recently carried out with the Macdonald Submersible Motor. This motor was coupled up to a Gwynne 8 in. Invincible pump and was suspended from the derrick of the salvage steamer *Lady Kate*. An 8 in. hose was suspended at a height of 83 ft. Directly the current was switched on, a full bore stream of water was discharged. With the hose removed a stream of water was turned into the air 6 ft. high.

The Automatic Leakage Indicator.—An ingenious apparatus has been invented by Capt. F. W. Young, M.I.M.E., chief surveyor to the Salvage association, and Mr. W. R. McDonald, consulting electrical engineer, to indicate leakage into the various compartments or tanks on shipboard. The leakage indicator consists of a number of cast-iron boxes arranged on the bulkhead at predetermined distances apart, each connected to the ordinary wiring system and containing a simple electrical device, not easily put out of order. As the water rises in the compartment, electrical contact is made in each box, thus causing a small glow lamp to light and a loud gong to ring until shut off. The lights connected to the various boxes may be of distinctive colours, and together with the gong may be grouped on an indicator board, on the bridge or elsewhere. When the water falls, each glow lamp is extinguished in turn. The apparatus is reckoned to be as reliable as it is humanly possible to make it and that it will require deliberate intention to put it out of order.

New Pilot Steamer for Liverpool.—A new steamer for the Mersey Pilotage was launched by Messrs. Murdoch & Murray, Port Glasgow, on May 17th. This vessel was named the *Alfred H. Reid* and will have triple-expansion engines supplied by Ross & Duncan, of Glasgow. Accommodation will be provided for forty pilots in four and two berth staterooms. The dining saloon, which will extend the full width of the vessel, will dine all the pilots at once.

Canadian Pacific Railway. Sir Thomas Shaughnessy, K.C.V.O. (President of the C.P.R.), sailed from Liverpool for Canada on the *Empress of Ireland* on May 16th. Sir Thomas stated that it was not yet settled what type of vessels the two new steamers for his Company are to be.

Liverpool Exhibition.—This Exhibition will, it is expected, be the only provincial exhibition held this year. The King and Queen will pay a visit to it on July 11th, while on a visit to the Earl of Derby. It will extend from May 22nd until October and will have an extensive Palace of Industries 400 ft. long with a central tower 200 ft. high. The grounds will have

an extent of 30 acres. The opening ceremony was performed by the Lord Mayor, J. Harwood Banner, Esq., M.P.

White Star Line. The *Ceramic* will leave Liverpool on July 24th on her maiden voyage to Australia *via* Cape Town. This vessel is 675 ft. long by 69 ft. 3 in. beam and has a gross tonnage of 18,000. She is fitted with twelve watertight bulkheads extending to the upper deck from the cellular double bottom. Triple screws will be driven by reciprocating engines and turbines. A Diesel engine will drive an emergency dynamo on the upper deck aft. Mr. Harold A. Sanderson has returned from a trip of several months to the United States and the Panama district and will assume the duties of the position now held by Mr. J. Bruce Ismay, who resigns on June 30th.

Sir Alfred Jones Memorial.—The City Council have approved that this Memorial be placed on a site opposite the Dock Board offices. A site between the floating bridge and the riverside station has also been selected for the Engine-Room Heroes' Memorial.

The Liverpool Screw Towing and Lighterage Coy.—The tug *Black Cock*, belonging to this Company, successfully reached Portsmouth on May 5th with the second caisson for the Admiralty from Belfast. This caisson is 135 ft. long and constituted no mean towing feat. The *Black Cock* later left Southampton for St. Vincent, Cape Verde Islands, whence she will tow the steamer *Newbridge* to Dunkirk for repairs.

NORTH-WEST OF ENGLAND.

(*From our Own Correspondent.*)

Barrow-in-Furness.—There is still very remarkable activity in the shipbuilding trade in the North-west of England, and all departments of local yards are very busy. There is an especial effort being made to speed up delivery of vessels, in the construction of which delays have occurred owing to strikes, scarcity of workmen and other causes. The orders in hand at the yard of Messrs. Vickers, Ltd., are enormous. At the moment some big schemes are in progress and others have to follow later on. By degrees the Vickers' yard is being made a thoroughly up-to-date establishment in every sense, and its capacity for dealing with a very big programme of business is being increased day by day. No new orders have been reported during the month, but that is not because the market is quiet, but because the firm want to get rid of some of the orders they have in hand before entering into any further commitments. There is still a great scarcity of men in several of the departments, and this to some extent is because there is a great want of artisan house property in the town. This is being remedied very quickly, and arrangements are in progress for the building of some seven hundred new houses within the next six months; when these houses are built there will be still need for more than a thousand more houses, as not only will these be needed for workmen Messrs. Vickers, Ltd., intend to employ shortly, but other schemes are in progress calculated to increase the population of the town, and probably still a second thousand houses will be needed before the requisite new house accommodation in the borough will be provided. There have been several minor strikes during the month, but these have all been settled as they have arisen. Bigger questions are looming in the distance, as between the boilermakers, the engineers and other branches of trade, but there is a feeling that terms will soon be arrived at, as it is not possible to contemplate any stoppage of work, and if the men are reasonable in their demands there is no doubt they will be met very fairly by the masters.

H.I.J.M.S. "Kongo."—This battle-cruiser, built by Messrs. Vickers, Ltd., for the Mikado's Government, has had her trials during the month, and has added further lustre to her builders. The trials took place on the Clyde, and in her full-speed trial she steamed above the requirements of her specification. Indeed, her speed is quite as fast as that of the *Princess Royal*, built by the same firm, and of the *Lion*, whose engines were built also at Barrow. It is known these battle-cruisers gained a speed of over 30 knots. The Japanese Government do not care to give away the results of trials of any of their vessels, but they are highly delighted with the performance of the *Kongo*. It is officially intimated that the *Kongo* steamed 25 knots at half her power, so that it is possible to estimate what she could do at full speed. Her gun trials passed off very satisfactorily. She is the first warship to carry 14-in. guns. These were tested at Eskmeals before being mounted, but when out at sea the *Kongo* fired several salvos with all her guns, with the highest possible results. The ship stood firmly up against the force of such big discharges. Indeed, the *Kongo* proved herself a very fine ship in a sea. Her full-speed trials were taken in the face of a big gale. The vessel has now returned to Barrow to be opened up, and prepared for service. It is likely she will leave Barrow in August.

The Turkish Battleship.—Although there has been no official announcement as regards the battleship *Reshad V.*, building at Barrow for the Turkish Government, it is generally understood that the British Government will take this vessel over and give her a new name. She is practically the same type as the British battleship *Iron Duke*. She is in a forward state and will soon be ready for launching. It is intimated however, that the Turkish Government is negotiating a British loan of ten millions to build two battleships, two battle-cruisers and other classes of war vessels, but perhaps she will need to put her house in order before it will be possible to negotiate a big loan.

H.M.S. "Delhi."—This British battleship is now making considerable progress, and it will not be long before she is ready for launching. She has been built under difficulties owing to the overhead crane accident, which necessitated the use of temporary cranes on the side of the vessel, but a new system of cranes has been adopted and the yard will soon be thoroughly efficient with up-to-date crane appliances on all the slipways. There is also good progress to note in the work of building the two "Town" class of British light cruisers which have been ordered from Messrs. Vickers, Ltd. These vessels are somewhat larger than the *Liverpool* and *Dartmouth*, built at Barrow, and which proved so highly successful on their trials.

Submarines.—Very great activity is to be seen in the submarine department, where several of these interesting vessels are in course of construction. Another of the "E" class will soon be launched, but most interest is centred in an experimental submarine of the "F" class which is being built under secret conditions, but which is known to be much larger and much more powerful than any submarine ever built. She will be swift, with a speed afloat of 25 knots, and will be a veritable submarine "Dreadnought" possessing means of great destruction.

Engineering.—The engineering department of Messrs. Vickers, Ltd., is very fully employed indeed, not only in the marine branch, but in the gun-mounting shops, where orders are held which represent briskness hitherto impossible on so large a scale. There are prospects of great activity in engineering for some time to come.

Hæmatites and Steel.—The hæmatite iron trade is quiet, but makers are fully charged with orders. Steel makers are fully employed and the price of shipbuilding classes of steel is very firm at late rates.

BELFAST.

(*From our Own Correspondent.*)

Belfast Harbour Board.—At a recent meeting it was announced that a 120-tons electric crane was being provided for shipbuilders at a cost of £17,000, and that four 5-tons electric gantry cranes had been ordered for the benefit of the coal trade in addition to extensive sheds about to be erected for the cross-Channel traffic.

Messrs. Harland & Wolff.—At the fitting-out wharves Messrs. Harland & Wolff have three vessels with an aggregate of over 42,000 tons. These are the White Star Australian liner *Ceramic*, Messrs. M'Ilwraith, M'Eacharn & Co.'s *Katoomba*, and the Pacific Steam Navigation liner *Andes*. The last-named vessel, which is 600 ft. long, by 67 ft. beam, and 15,300 gross tonnage, was launched from the south end of the yard on 8th May. Half a gale from the south-east was blowing when the vessel left the ways, and a hawser getting foul of the propeller of one of the tugs in attendance, the *Andes*' stern was carried over to the Donegal Quay. The impact was slight, and caused damage of only a trifling nature. Owing to the severity of the weather it was found advisable to berth the vessel at the Donegal Quay until the

wind moderated next morning, when she was towed to the fitting-out wharf. The *Andes*, though built to the order of the Pacific Steam Navigation Co., is to sail on the Royal Mail Steam Packet Co.'s service between Southampton and Rio Janeiro and Buenos Ayres. The propelling machinery will be of the combined reciprocating and turbine type. A sister ship for the same service is under construction on one of the inner slips in the same end of the yard. Rapid progress is being made with the three leviathans building at the north end, to which reference was made in last month's notes, and all three will be launched early in 1914. Messrs. Harland and Wolff have commenced filling-in operations at the ground recently acquired by them at the rear of their engine works. This land lies considerably below the level of the existing works, and an enormous quantity of material will require to be dumped and the ground well piled for the foundations of buildings and heavy machinery.

Messrs. Workman, Clark & Co. launched a twin-screw fruit carrier named *Patuca* from their south yard on 26th April. This vessel is the latest addition to the large fleet of steamers already built by them for Messrs. Elders & Fyffes' fruit and passenger service between British and West Indian and Central American ports. She is 432 ft. long with a gross tonnage of about 6,000. The propelling machinery consists of two sets of triple engines, steam being supplied by four large boilers working under forced draught. Amongst other vessels of importance at present under construction by this firm, may be mentioned two steamers for the Royal Mail Steam Packet Co., and three for Messrs. J. P. Corry & Co.'s Star Line, all the vessels of which latter company have been built by Messrs. Workman, Clark & Co.

New Head Liner.—The *Garron Head*, which is the latest addition to the fleet of the Ulster Steamship Co., was recently launched by Messrs. Irvine's Shipbuilding Co. The new vessel is 295 ft. by 40 ft. by 20 ft. 6 in. Triple engines having cylinders 20½ in. by 33 in. and 54 in. by 36 in. stroke, and working at 180 lbs. pressure, will be supplied by Messrs. Richardsons, Westgarth & Co., Ltd.

LAUNCHES AND TRIAL TRIPS.

LAUNCHES—English.

H.M.S. Birmingham.—On May 7th H.M.S. *Birmingham*, light cruiser of the "City" class, designed by Sir Philip Watts, was launched from the Elswick shipyard of Messrs. Armstrong, Whitworth & Co., Ltd. The vessel is the fifteenth of her class, and the third of her class to be built at Elswick, her predecessors there being the *Newcastle* and *Weymouth*. The vessel has a displacement of 5,400 tons, a speed of nearly 26 knots and the estimated cost, including guns is £351,415. The vessel was laid down June, 1912, and is to be completed this year. Her propelling machinery will be Parsons Turbines and her boilers by Yarrow.

Sevilla.—On April 19th Messrs. Wood, Skinner & Co., Ltd., of Bill Quay, Newcastle-on-Tyne, successfully launched from their shipbuilding yard, a new steel screw steamer which they have built to the order of Messrs. Otto Thoresen's Linie, of Christiania, Norway. The vessel is a sister ship to the s.s. *Salamanca*, which the builders recently constructed for the same owners. She has two complete decks, and is specially fitted with the most modern arrangements for fruit carrying. Water ballast is provided in the cellular double bottom all fore and aft, and also in the after peak tank. The saloon and passengers' berths are in a large steel deckhouse amidships, with captain's room and chartroom in house above, the officers and engineers being berthed in side-houses on each side of the engine casing and the crew in deckhouse aft. The propelling machinery, which will be fitted by Messrs. North Eastern Marine Engineering Co., Ltd., of Wallsend-on-Tyne, is of the improved triple expansion type, supplied with steam by two large steel multi tubular boilers, working at a high pressure under forced draught and fitted with Schmidt's system of Superheaters. Both the ship and engines have been constructed to the requirements and under the special survey of Det Norske Veritas for their highest classification, and also to comply with the regulations of the Norwegian Law. Mr. Carl Conradi, of Christiania, has supervised the construction of both the ship and machinery on behalf of the owners.

African Transport.—On April 21st, the Northumberland Shipbuilding Co., Limited, Howdon-on-Tyne, launched the finely moulded steamer, *African Transport*, which has been built to the order of Messrs. Furness, Withy & Co., Ltd., West Hartlepool, for the Empire Transport Co., Limited, London. The vessel is about 400 feet long x 52 feet beam x 29ft. 6in. deep, of the single deck type, and has been built under special survey to the highest class at British Corporation. She is fitted with long bridge, poop and top-gallant forecastle, and accommodation is provided in steel houses on bridge deck. There are 10 steam winches by Messrs. Clarke, Chapman & Co., Ltd., a large number of cargo derricks and steam winches by Messrs. Emerson, Walker & Thompson Bros. The usual water ballast arrangements for light passages are fitted. The machinery will be supplied by Messrs. Richardsons, Westgarth & Co., Limited, of Sunderland, consisting of engines with cylinders 25in., 40in., 68. x 48in. stroke, three large boilers with 180lbs. pressure. The vessel will carry over 8000 tons on a light draft, and steam about 10 knots loaded at sea. During construction the vessel has been superintended by Mr. Ross and Mr. Flowers.

Ridley.—On April 22nd the Blyth Shipbuilding & Dry Docks Co., Ltd., launched from their Shipbuilding & Graving Docks Works a steel screw steamer which has been built to the order of Messrs. Stephens, Sutton & Stephens, of Newcastle-on-Tyne. This vessel, the dimensions of which are 342ft. 7in. long, by 47ft. 6in. breadth extreme, by 25ft. 7in. depth moulded, has been constructed under special survey to Lloyd's highest class. She is of the single deck type, with poop, bridge and open topgallant forecastle. The accommodation for captain, officers and engineers is provided in steel houses on bridge deck, and the crew will be berthed in the poop. Specially adapted for the general cargo and wood trade, the vessel has also steel centre line bulkhead with shifting boards throughout for carriage of grain. She will be equipped with deck machinery of the best and up-to-date design for expeditious handling of cargoes. Triple expansion engines, having cylinders 24, 40 and 65 by 42in. stroke will be supplied by Messrs. North Eastern Marine Engineering Co., Ltd., of Wallsend. During construction the hull and machinery have been under the supervision of Mr. Cowen Landreth, Superintendent to Messrs. Stephens, Sutton & Stephens.

Lord Lansdowne and Lobster.—On April 22nd, there was launched from the yard of Messrs. Cochrane and Sons, Ltd., Shipbuilders, Selby, a steel screw trawler, *Lord Lansdowne*, the principal dimensions being, 133ft. 4in. by 23ft. by 12ft. 9in. moulded. The vessel has been built to the order of Messrs. The Yorkshire Steam Fishing Co., Ltd., Hull, and will be fitted with powerful triple expansion engines by Messrs. C. D. Holmes & Co., Ltd., of Hull. On the same day there was launched a steel lighter, *Lobster*, the principal dimensions being 100ft. by 21ft. by 9ft. 6in. The vessel has been built to the order of Messrs. R. & J. H. Rea, of Liverpool.

Yewgarth and Limpet.—On April 23rd, there was launched from the yard of Messrs. Cochrane and Sons, Ltd., Shipbuilders, Selby, a steel screw tug, *Yewgarth*, and also a steam lighter, *Limpet*. The dimensions of the former are 85ft. b.p. by 21ft. by 10ft. moulded, the latter being 100ft. by 21ft. by 9ft. 6in. moulded. Both vessels have been built to the order of Messrs. R. & J. H. Rea, of Liverpool, and the tug is to be fitted with powerful compound engines by Messrs. C. D. Holmes & Co., Ltd., of Hull.

Charles Le Borgne.—On April 24th Messrs. Osbourne, Graham & Co., launched from their yard at Hylton, Sunderland, the steel screw steamer, *Charles Le Borgne*, which they have specially constructed to the order of the Societe Fecampoise de Navigation, Fecamp (Andre Taurin, Managing Director). The vessel is of the raised quarter deck type, and is 220ft. by 33ft. 3in. by 15ft. 9in. She is of the latest type of self-trimming collier specially built for the coal trade between English and French ports, and will carry about 150 tons on a very shallow draft. Arrangements are made for a large amount of water ballast. Rooms for the captain and officers are tastefully fitted out in hardwood and are of large size. The vessel is fitted with the most modern deck appliances including steam winches, steam capstan, and quick warping windlass, and will also be fitted with a complete installation of electric light. She has been con-

structed to Lloyd's highest class, and also complies with the requirements of the French Law. Engines will be supplied by Messrs. MacColl & Pollock, Sunderland, having cylinders 17in., 28in., and 46in. by 33in. stroke, with two large boilers, and capable of driving the vessel a speed of 10 knots loaded. During construction the hull and engines have been under the supervision of Messrs. Swan and MacFarlane, of Newcastle-on-Tyne. The vessel proceeded direct to the Engineers' Works.

City of Norwich.—On May 6th, Messrs. William Gray and Company, Limited, launched the steel screw steamer, *City of Norwich*, which they have built for the Hall Line Section of the Ellerman Line, Limited, Liverpool. The vessel is built of the following dimensions:—Length overall 447ft., breadth 54ft. 8in., and depth 33ft. 10in., and will be assigned to the highest class in Lloyd's Register. She is a handsomely modelled vessel, built with a cruiser stern, and will be equipped for wireless telegraphy. She has two decks laid, long poop, bridge and topgallant forecastle, and very tasteful cabin accommodation in houses on the bridge deck for passengers, captain, officers and engineers, and the crew's accommodation is in a house at the fore end of the poop. An electric lighting installation is fitted throughout the vessel. The cellular double bottom extends from stem to stern, and a deep tank hold compartment is fitted for water ballast, abaft the engine room, giving a total capacity for water ballast of about 2250 tons. The whole of the equipment is of the most approved description including sanitary tanks, fresh water distiller, steam windlass, steam steering gear, fourteen derricks, thirteen steam winches with return exhaust to winch condenser of the contraflo type. Triple expansion engines are being supplied from the Central Marine Engine Works of the builders, having cylinders 25¾in., 44½in. and 77in. diameter, with a piston stroke of 51in., and three large steel boilers, adapted to work at a pressure of 220lbs. per square inch, and fitted with Howden's forced draught. The Engines are fitted with "Cmew" main and auxiliary condensers and a pair of Weir's feed pumps and direct contact heater, which in conjunction with a special arrangement of boiler feed heating by means of the exhaust steam insure a high feed temperature. The Engine room auxiliaries are very complete and include evaporator, feed and ballast pumps, etc., of the "Cmew" type. The ship and machinery have been built under the superintendence of Mr. Alexander Dalrymple, assisted by Mr. Robert Sharp, on behalf of the owners.

Dernes. On May 6th there was launched at Goole a steel screw steamer, 108ft. 6in long, and designed to carry 1100 tons dead weight. She has been built under special survey to take Lloyd's highest class. Triple expansion engines of good power will be fitted by Hull engineers. The vessel has been built to the order of Mr. A. Calvert, of Goole, and as she left the ways was gracefully named *Dernes* by Miss Calvert.

Nominoe. On May 7th, Messrs. William Gray and Company, Limited, launched the steel screw steamer, *Nominoe*, which they have built for Messrs. Societe Anonyme des Voiliers, Nantais, Nantes. She will take the highest class in Lloyd's Register, and is of the following dimensions, viz. Length overall 331ft. 6in., breadth 46ft. 6in., and depth 23ft. 5½in., with long bridge, poop and topgallant forecastle. The saloon, captain's, officers' and engineers' rooms, etc., will be fitted up in houses on the bridge deck, and the crew's berths in the forecastle. The hull is built with deep frames, cellular double bottom, and large after peak ballast tank, six steam winches, steam steering gear amidships, hand screw gear aft, patent direct steam windlass, large horizontal multitubular donkey boiler, stockless anchors, telescopic masts with fore and aft rig, and all requirements for a first-class cargo steamer. Triple expansion engines are being supplied by the Central Marine Engine Works of the builders, having cylinders 23in., 36½in., and 62in. diameter, with a piston stroke of 42in., and two large steel boilers for a working pressure of 180lbs. per square inch. The ship and machinery have been built under the superintendence of Mr. A. Martail on behalf of the owners.

Wascana.—On May 7th, Sir Raylton Dixon & Co., Ltd., launched from their Cleveland Dockyard, Middlesbrough, a steel screw steamer which they are building to the order of Mr. Ragnvald Blakstad on behalf of the Aktieselskabet Asker, Christiania. The vessel is of the builders' latest improved patent cantilever construction with top-side water-ballast tanks and is being constructed to receive Lloyds 100A1 classification, single deck type with poop, bridge and forecastle. Her principal dimensions are 393ft. by 52ft. 6in. by 30 ft. moulded, and she will have a deadweight carrying capacity of about 8000 tons on a light draft of water. She will have 5 large hatchways, four holds absolutely free from all obstructions such as beams, pillars or web frames and perfectly self-trimming owing to the sloping sides of the top-side tanks at each side of the ship, and of the total amount of about 2800 tons of water ballast which the vessel can carry, more than half this quantity will be contained in the top-side tanks. The steamer will have two masts, two derrick posts and ten derricks, hand and steam steering gear, electric light, and the equipment will consist of ten steam winches, steam windlass, and all the latest and most modern appliances for the rapid handling of cargo. Triple expansion engines having cylinders 25½in., 42in., and 70in. by 48in. stroke, supplied with steam by three large single ended boilers working at 180lbs. pressure will be fitted by Messrs. Richardsons, Westgarth & Co., Ltd., Middlesbrough. The hull and machinery are being constructed under the supervision of Captain Harboe Jensen, the owners' superintendent, and Messrs. C. A. Bushell, Nicol & Co., of Newcastle-on-Tyne.

Westerdyk.—On May 7th, Messrs. Irvine's Shipbuilding and Dry Docks Co., Ltd., launched from their Middleton Shipyard, West Hartlepool, the steel screw steamer, *Westerdyk*, being the second of two very fine vessels which they are building for the Holland America Line of Rotterdam. The dimensions of the vessel are 470ft by 55ft. by 41ft. 7½in. depth moulded to the shelter deck, and complete main, upper and shelter decks are fitted, with a tier of strong beams at the lower deck height, and steel grain divisions all fore and aft. She is built to Lloyd's highest class, having bulb angle frames, and a cellular double bottom is fitted all fore and aft for water ballast, together with a deep tank at each end of the engine and boiler space. The vessel is fitted with four masts of sufficient length for the carrying of the aerial wires in connection with a Marconi installation, and a most complete and up-to-date arrangement of loading and discharging gear is provided, consisting of 20 7in. by 12in. silent running steam winches, together with eight derrick posts and 32 Mannesmann steel derricks; in addition to this a 40-ton steel derrick is fitted so as to deal with heavy lifts in either No. 1 or No. 2 hold, a special worm gear winch being provided for working this derrick. A combined steam and hand steering gear is fitted direct on the rudder head, with telemotor attachment amidships, patent direct steam windlass, stockless anchors, four lifeboats and two jolly boats, providing sufficient boat accommodation on either side of the vessel for every person on board, and a complete installation of electric light, including signal lamps, binnacles and cargo clusters at each hatch. A special electric light installation is also fitted throughout the holds and 'tween decks, which has been found necessary for effectively handling the valuable cargoes carried by this Company. A special feature of this vessel is that the whole of the accommodation, including the sailors and firemen, is placed in a large steel house on the shelter deck amidships, having a promenade deck over same 150 feet in length. The sailors and firemen are berthed in separate compartments, with large messroom, washplaces, lavatories, etc., for each department. Accommodation generally for the captain, officers and engineers is fitted in spacious rooms, special attention having been paid to light and ventilation; steam heating is also fitted throughout the whole of the accommodation. A special Marconi room is situated on the shelter deck amidships, complete with silent chamber, etc., and a long distance wireless telegraphy installation is being fitted by the Marconi Company. Ample store room, ice house, etc., are fitted throughout the vessel, together with cool cupboard in the pantry. The machinery, which has been constructed by Messrs. Richardsons, Westgarth & Co., Ltd., Hartlepool, consists of a powerful set of balanced quadruple expansion engines, with six large boilers working under natural draught at a pressure of 215lbs. per square inch. The cylinders are 27½in., 37⅜in., 55in. and 84in. diameter by 60in stroke, each being independent, with receiver pipes of steel and universal expansion glands. The high pressure cylinder is fitted with a piston valve, the two intermediate

cylinders with flat balanced valves, and the low pressure with a double ported slide valve, the ports and passages being in accordance with the engine builders' latest practice. Each of the cylinders is supported by two heavy cast iron columns which are braced together at the top with strong box girders, these also forming supports for the reversing gear. The shafting throughout is of fluid compressed steel, the crankshaft being in four interchangeable parts with webs of special form as required for the system of balancing: the large four bladed propeller is made entirely of bronze. The condensing and feed heating installation is very complete and embraces the entire "Contraflo" system as adopted when independent feed pumps are fitted in addition to the feed pumps on the main engines. The system comprised "Contraflo" main and anxiliary condensers, direct contact oil separating feed heater, cascade water filter and thermal receiver and drainage separator, the independent feed pumps being of the Mumford "Dreadnought" type. An excellent arrangement has been effected in the engine room of the large number of auxiliaries; these, in addition to those forming part of the "Contraflo" system, include Drysdale centrifugal pump, Mumford auxiliary feed pump, float controlled from cascade filter, Mumford's ballast and general service pumps, and combined air and circulating pumps for the anxiliary condenser, also a Morison's Surface Feed Heater and large evaporator of the vertical radial type. The hull and machinery have been built to the Holland America Co.'s specifications, and the contract has been carried out under the supervision of Mr. H. Van Holden, the Company's Naval Architect.

Purley.—On May 8th, Messrs. Richardson, Duck & Co., Ltd., launched from their yard a steel screw steamer of the following dimensions, viz.:—Length overall about 404ft., breadth extreme 52ft. 6ins., depth moulded to shelter deck 35ft. 8in., with a deadweight carrying capacity of about 8,400 tons. This vessel, on the "Isherwood" system of construction, has been built to the order of Messrs. Houlder Middleton & Co., Ltd., London, and will class 100A1 in Lloyd's Register under special survey. She has two complete decks, viz., shelter deck of iron and upper deck of steel, height between decks being 7ft. 8in. There are six extra large hatchways to expedite loading and discharging, the main hatch being 36ft. by 24ft. Extra large and roomy accommodation for captain, officers, engineers and apprentices is provided in steel deckhouses on shelter deck, and petty officers and sailors and firemen are berthed in shelter deck 'tween decks aft. Special attention has been paid to lighting in all accommodation and steam heating will be fitted to all 'midship accommodation. The vessel is fitted with a steel bulwark amidships from fore end of saloon house to after end of engineers' side houses. A steel bulwark is also fitted from after end of fore hatch to stem. A cellular donble bottom (9in. deeper than rule) is fitted throughout for water ballast. The vessel has also peak tanks, and equipment includes electric lighting, 12 steam winches, winch condenser with circulating pump, derrick tables (forming houses for cargo gear) and crosstrees on masts, four derrick posts, twelve derricks, steam windlass with quick warping ends, steam steering gear by Caldwell & Co., hydraulic rudder brake, stockless anchors, fresh water condenser, and a good inventory and outfit. The engines, by Messrs. Blair & Co., Ltd., have cylinders 26in., 42in., 70in. by 48in. stroke, steam being supplied by three extra large single-ended boilers having a working pressure of 180lbs. The propeller has cast iron boss and four loose bronze blades, and zinc plates are fitted on stern frame. The vessel has been built under the superintendence of Captain R. A. Gray, of Sunderland.

Acadia.—A steamer intended for the hydrographic service of the Canadian Government has been launched from the Neptune Works of Messrs. Swan, Hunter & Wigham Richardson, Ltd. The vessel is 170 ft. in length by 33½ft. beam, and will be built to attain the highest class in Lloyd's Register. She will be propelled by a set of triple-expansion engines supplied with steam by two boilers working under forced draught, both engines and boilers being constructed at the Neptune Works. The vessel is expected to have a speed of 12 knots. She is built of steel, and strengthened to enable her to run through ice, and will be completely outfitted for her intended service, having two motor launches, sounding machine, marine sentry, sounding winch, electric light with projector, etc. Besides the usual accommodation for the deck and engine-room officers, there will be well furnished rooms for the various officials engaged in survey work. Three years ago, Messrs. Swan, Hunter & Wigham Richardson, Ltd., built for the Canadian Government's hydrographic service the steamer *Cartier,* a vessel somewhat similar to the *Acadia,* but having twin screws.

Sagoland.—On May 8th, there was launched from Messrs. Earle's Shipbuilding & Engineering Co., Ltd., yard, Hull, a single screw steamer. The vessel which is named *Sagoland* has been built to the order of The Angfartygs Aktiebolaget Tirfing of Goteberg, the Managers of the Company being Messrs. Axel Brostrom & Son, and is intended for their iron ore, grain, and general trades. The principal dimensions are:—Length 430ft., breadth 53ft. 1in., moulded depth 28ft. 11in. She is constructed of steel throughout to Lloyd's 100A1 class, special survey, and to the latest requirements of the Board of Trade including Suez Canal and grain carrying certificates, and the new Life-saving Appliances Rules. The vessel is of the single deck type with complete shelter deck, and designed for carrying a large quantity of water ballast in cellular double bottom, after peak, and large deep tank. She has six large cargo hatchways, two steel masts and four derrick posts arranged with twelve derricks, and twelve powerful steam winches for the speedy handling of cargo, also an up-to-date steam windlass. The holds are fitted with steel grain divisions. The steam steering gear is placed in the engine casing, and hand steering gear, having specially large quadrant, on shelter deck. On the forward part of shelter deck a commodious saloon house is erected, in which are room for owner, officers and stewards. The captain's cabin and chart room are arranged in a house on bridge. The engineers are berthed in side houses abreast the engine casing. A feature of the vessel is the spacious accommodation provided for the crew under shelter deck aft: this consists of separate mess rooms, sleeping cabins, and lavatories for each grade. The accommodation will be fitted with steam heating apparatus, and a complete installation of electric lighting has been arranged. The machinery consists of a set of triple expansion engines having cylinders 28in., 45½in. and 76in. diameter by 54in. stroke, steam being supplied by three large single-ended cylindrical boilers working with Howden's forced draught and at a pressure of 180lbs. per square inch. The ship and machinery have been constructed under the superintendence of Mr. F. Lindahl.

Evangelos.—On May 10th there was launched from the Southwick yard of Messrs. Robert Thompson & Sons, Ltd., a first-class screw steamer, built to the order of Messrs. Ambatiolo Brothers, of London. Her principal dimensions are:—Length overall 387ft. 6in., breadth 51ft. 6in., depth moulded 25ft. She is classed 100A1 at Lloyds, under special survey, and is specially strengthened, the frames being spaced closer than the rules. She is of the single deck type, with a full poop, bridge amidships 230ft. long, both available for cargo, and topgallant forecastle, where the petty officers and crew are comfortaby berthed. An extra large quantity of water ballast is provided for in the cellular bottom and fore and after peaks, the cellular bottom being subdivided both athwartships and longitudinally for trimming purposes. The bunkers and tank top in engine and boiler rooms are coated with patent enamel, the inside of engine and boiler room tanks being coated with a special preparation, and the holds, 'tween decks, and fore and after peaks, etc., with Siderosthen Anti-Corrosive Solution. Particular care has been taken with the arrangement of the accommodation. There is a large house containing saloon, chief officer, steward, purser and apprentices, also pantry and store, with a staircase arranged for access to the room of the captain, who is berthed in a steel house built on top of the saloon house, the room being panelled out in mahogany, as is also the office adjoining. The saloon itself is most tastefully designed, the whole scheme of decorations blending very effectually and producing a most pleasing result, in fact, for this type of vessel the work is of an unusually elaborate character. The chart and wheel houses are also of steel, and are erected on the upper flying bridge. The officers and engineers are placed in a large steel house abreast the engine room casings, with messrooms, bathrooms, and stewards' berth. The cargo holds, clear of all obstruction, are divided by a centre longitudinal steel bulkhead, with five cargo hatchways, having double derricks to each. Steel houses are fitted round the masts for stowing cargo gear, and the

derrick posts are also fitted to poop and bridge hatches, all of which are arranged to facilitate the rapid loading and discharging of cargo, and worked by eight powerful steam winches. A large multitubular high pressure donkey boiler is fitted in the stokehold for supplying steam to the deck machinery. There is also a patent vertical direct steam windlass. The steam steering gear is placed in the after end of the casing, and the after hand gear is fitted with a patent brake arrangement. There is a complete installation of electric light fitted throughout the vessel, including clusters arranged for discharging and loading cargoes. The vessel is thoroughly up-to-date, and the outfit includes the latest appliances for navigation, deep sea sounding machinery and log is fitted with outrigger booms for working from bridge. A patent self-adjusting accommodation ladder is also fitted. The engines are by Messrs. John Dickinson and Sons, Ltd., Sunderland, having cylinders 25in., 41in., and 68in., with a stroke of 48in., steam being supplied by two large boilers working at a pressure of 180lbs. per square inch. Crompton's patent ash hoist with self-tipping arrangement and tube to ship's side is also fitted, and a very full specification. During construction the vessel and her machinery have been under the supervision of Messrs. Ferguson & Law, of Cardiff.

Carron Head.—On May 10th, Messrs. Irvine's Shipbuilding and Dry Docks Co., Ltd., launched from their Harbour Dockyard at West Hartlepool, the steel screw steamer, *Garron Head*, for account of the Ulster Steamship Co., Ltd., Messrs. G. Heyn & Sons, Belfast, Managers. The vessel will be of the highest class of the British Corporation Register and complies with the Board of Trade requirements for a first class cargo steamer to carry about 3250 tons deadweight, and is of the following dimensions :—Length 295ft., breadth 40ft. 2in., depth 20ft. 6in.; about 2000 tons gross register. The *Garron Head* has been specially built and arranged for the Baltic trade of the company from Russian ports to Belfast and Dublin, is schooner rigged with two masts, has long bridge house amidships, also forecastle and poop. Accommodation for captain, officers and engineers and a few passengers is arranged in steel houses above the bridge deck, with chart house, flying bridge and wheel house on top. The outfit for working cargo is very complete, including double derricks throughout, with six special steam winches, steam windlass and warping arrangements, also steam steering gear, electric light, and all modern improvements. The machinery, which has been constructed by Richardsons, Westgarth & Co., Ltd., Hartlepool, is of similar size to that supplied to the s.s. *Black Head* but in the *Garron Head* the design embodies a "Richardson" standard engine with Contraflo Condenser, and the auxiliaries include the necessary details for the complete Contraflo system. The cylinders are 20½in., 33in., and 54in. by 36in., steam being supplied by two single ended boilers working at a pressure of 180 lbs. per square inch. All the auxiliary exhausts, including the electric light engine and steering engine, also the Morison's Evaporator are utilised for food heating and these are collected in a thermal receiver and steam cleanser before passing into the cascade food water filter and heater. The auxiliary condenser is of the Contraflo type, and in addition to the usual ballast and feed donkeys there is an independent Harbour Feed Pump, float controlled from the cascade filter. The hull and machinery have been constructed under the supervision of Mr. Hugh Wisnom, M.I.N.A., the Company's Superintendent. The *Garron Head* is the second steamer built by Messrs. Irvine's for the same owners, and is expected to be ready for sea before the commencement of June when she will take her place on the Company's line from Riga to Belfast. Messrs. Irvine's have another steamer building for the same owners for delivery about September next, to be named the *Orlock Head*. The *Garron Head* will be commanded by Captain Edmund Suffern, late of s.s. *Teelin Head*, who has had long experience in the Baltic Service of the Company.

Single-Decked Steamer.—There has recently been launched from the yard of the Sunderland Shipbuilding Co., Ltd., a single-decked steamer, which has been specially built for the Canadian Lake service, and which is to take the highest class at British Corporation. The leading dimensions are : Length 257ft., breadth 42ft. 8½in., and depth 18ft. 6in. Deck houses are placed aft over machinery, with sun deck above, and over the top-gallant forecastle is fitted a Texas house. The vessel is fitted with clear holds for the carrying of grain in bulk, and is built with deep cantilever frames in order to dispense with pillars. Accommodation for captain and owner is provided in house on forecastle deck, and for officers and engineers aft, whilst the sailors and firemen are berthed in fore end of boiler-room casing. The saloon is in a deck-house at the after end, and is fitted up in polished hardwood. A complete installation of electric light is fitted, and all living rooms are heated by steam. The deck machinery consists of four steam winches, steam steering gear, and direct steam capstan windlass. The main engines are by Messrs. MacColl & Pollock, Ltd., Sunderland, and have cylinders 17in., 28½in., and 46in. by 33in. stroke, steam being supplied by two large boilers working at a pressure of 185lbs. per square inch. The vessel has been constructed to the order of Messrs. Dwyer & Hennessy, of Ottawa, and during building has been inspected by Messrs. J. Reid & Co., Glasgow.

LAUNCHES—Scotch.

Ingoma.—On April 22nd, there was launched from the yard of Messrs. David & William Henderson & Co., Ltd., Partick, Glasgow, the steel screw steamer, *Ingoma*, which they have built to the order of Messrs. Thos. & Jas. Harrison, Liverpool, for their Harrison's Rennie Line of passenger and cargo steamers trading between London and South Africa. The dimensions of the vessel are 416ft. by 52ft. by 31ft. moulded, with a gross tonnage of about 5700 tons, and she is built in excess of the requirements of Lloyd's Registry for their highest class. Handsome and up-to-date accommodation is provided amidships for over 100 first-class passengers, the staterooms are large and airy, and every attention has been given to them that will add to the comfort of the passengers, including an electric fan to each room; to meet the modern demand quite a number of these rooms contain single berths only and a large number are specially adapted for the use of families travelling together; the furnishings throughout are tasteful and attractive, the chief aim being to provide comfortable, roomy and well ventilated accommodation for the increasing number of passengers travelling to the South African Dominion. The dining saloon, in enamelled white, extends the full width of the vessel, and will seat about 100 persons at small rectangular tables. The music room also in enamelled white, is of neat and elegant design, and the smoking room in polished mahogany. Special attention has been devoted to the ventilation which is, throughout the entire ship, of the most complete type and suitable for the special trade in which the vessel will be engaged. The vessel is fitted with wireless telegraphy, as are the other steamers of this line, which was the first to introduce the wireless system into the South African Trade. A complete installation of electric light has been fitted throughout; refrigerating machinery and chambers for carriage of stores and cargo are also fitted. As the vessel is likewise intended to carry a large amount of cargo every modern convenience for the rapid handling of same is supplied. The machinery, which has been constructed by the builders upon the newest designs is of ample power to drive the vessel at a high speed. This steamer will be a valuable addition to the fleet known as the Rennie Line, now controlled by Messrs. Thos. & Jas. Harrison, which fleet has been engaged in the South African Trade for the past half century. The vessel has been constructed under the superintendence of Mr. R. D. Richardson, assisted by Mr. Sheriff. Messrs. Matthew Keenan & Co., Ltd., are applying their patent non-conducting composition to the cylinders, boilers and steam pipes of this vessel.

St. Winifred & St. Theodore.—On April 22nd, two vessels, both built to the order of Messrs. Rankin, Gilmour & Co., Liverpool, but by separate firms, were launched at Port Glasgow. The steamers were the *St. Winifred* and the *St. Theodore*. The former, a vessel of the poop bridge and forecastle type, has been built to the highest class at Lloyd's. Her dimensions are :—Length 385ft., breadth 52ft., and depth moulded 29ft.; and she is of 4300 tons gross. The *St. Theodore*, which is 419ft. long, has a deadweight capacity of 8250 tons. She has a large cargo poop, bridge, topgallant forecastle, and large clear holds. She will be classed with Lloyd's for their highest class, and has been built on the Isherwood system. Both vessels during construction have been supervised on behalf of the owners by Mr. James Reid, engineer superintendent, and Captain Pugh, marine superintendent, assisted by Mr. David Forrest, resident surveyor, Greenock.

Knight Companion.—On April 23rd, there was launched at Scotstoun the steamer, *Knight Companion,* which has been built to the order of the Knight Line, of which Messrs. Greenshields, Cowie & Co., Liverpool, are managers. The vessel is of about 7400 tons gross, and about 12,000 tons deadweight carrying capacity. She has been built to Lloyd's highest class, and is fitted with all the latest requirements for the rapid and efficient working of cargo. Triple-expansion engines are being supplied.

Sebastian.—On April 24th, this vessel, which is being built by The Caledon Shipbuilding Co., of Dundee, was successfully launched from their yard. The vessel is of the following dimensions :—Length b.p. 310ft., breadth moulded 45ft., and depth moulded 26ft. 3in. The vessel is constructed to carry oil in bulk, and to conform to the Suez Canal Regulations. She is being built to Lloyd's highest class under the three deck rule, and both hull and machinery are being constructed under the supervision of Messrs. Flannery, Baggallay & Johnson, Ltd., of London, Liverpool and Rotterdam. This vessel is to be fitted with two Polar Diesel Motors, constructed by the Aktiebolaget Diesels Motorer, Stockholm, and are placed at the after end of the vessel. They consist of two sets of two cycle motors, six cylinders each, and the usual accessories of air compressors, etc., each engine to develop a brake horse power of 200 on a small number of revolutions. The auxiliary gear is partly run by Auxiliary Diesels and partly by steam, for which latter purpose there are two multitubular marine type boilers, one placed in the engine room, and one on deck, which boilers also burn liquid fuel. The oil cargo is dealt with by two large Hayward-Tyler pumps and the usual deck steam auxiliary machinery. The vessel has oil bunkering capacity for long voyages.

Uncas.—On April 25th, there was launched at Greenock, the steamer, *Uncas,* built on the Isherwood system for the carriage of oil in bulk under special survey. The vessel is the second oil steamer built on that system on the Clyde. She has been constructed to the order of the Tank Storage and Carriage Company, Ltd., London, under the superintendence of Captain Crocker and Captain Stewart, the latter of whom will command the vessel. She will carry 7200 tons on a light draught, and her principal dimensions are :—Length 380ft., breadth 51ft. 9in., depth 28ft. 8in. The *Uncas* has been designed to carry all classes of oil from the lightest down to the heaviest grades.

Cerasimos.—On May 3rd, there was launched by Messrs. Napier & Miller, Ltd., Old Kirkpatrick, the steel screw steamer, *Gerasimos,* built to the order of Mr. N. D. Lykiardopulo, of London. The vessel has been built to the highest class under Lloyd's rules. The principal dimensions being 375ft. length b.p., 51ft. 6in. breadth, 25ft. 6in. depth, with a gross tonnage of about 4000 tons, and cargo capacity of fully 6600 tons. She has poop, long bridge and topgallant forecastle, with water ballast in cellular double bottom, aft peak and fore peak tanks, and has a most convenient arrangement of hatches, derricks and steam winches for the rapid handling of cargo, electric light fitted throughout. The machinery, which is being supplied by Messrs. J. G. Kincaid and Co., Ltd., Greenock, consists of triple expansion engines with cylinders 25in., 41in., 68in. by 48in. stroke, and three boilers of large size. Hull and machinery have been constructed under the direction of Mr. William Law, Consulting Engineer, Liverpool.

Manora.—On May 6th, the twin-screw steamer, *Manora,* which is being built and engined at Whiteinch, to the order of the British India Steam Navigation Company, was launched. The vessel, which is intended for the intermediate service between London and Bombay, is 464ft. in length, 58ft. in breadth, and 36ft. in depth. Accommodation is provided amidships for 25 first-class and 42 second-class passengers. The *Manora* will be propelled by twin screws driven by triple-expansion surface condensing engines, supplied with steam from five single-ended boilers working under forced draught. The machinery is designed to give a speed of 13½ knots.

Woniora.—On May 8th, the screw steamer, *Woniora,* built to the order of the Bellambi Coal Company, Sydney, N.S.W., per Messrs. M'Ilwraith, M'Eacharn & Co., Proprietary, London, was launched by Messrs. Hall, Russell & Co., Aberdeen. The vessel, which is a sister ship to the *South Bulli,* launched by the same firm in April, will take the highest class in Lloyd's register, and is of the following dimensions :—Length, 204ft., breadth 30ft., and depth 18ft. 3in. She has been specially constructed for the coal trade.

Asturiano.—On May 8th, the Ailsa Shipbuilding Co., Troon, launched the single-screw steamer, *Asturiano,* the first of two vessels which they are building to the order of Messrs. Duncan, Fox & Co., London, for Cia Argentina de Navegacion a la Patagonia, for their passenger and cargo service between Buenos Ayres and Punta Arenas. The dimensions of the vessel are :—Length between perpendiculars 310ft., breadth moulded 41ft. 6in., and depth moulded 23ft. Accommodation is provided on the upper and bridge decks amidships for 100 first-class passengers on the upper deck aft. The first-class public rooms consist of a large dining saloon, a smoking room, and a ladies' cabin. A large refrigerating chamber for provisions and cargo is built on the main deck aft of the machinery space. The vessel is being supplied with wireless telegraphy apparatus of the Telefunken type. The propelling machinery, which will be supplied by the builders, consists of triple-expansion engines, having cylinders 22½in., 36in., and 59in. diameter respectively, with a 45in. stroke. Steam will be supplied from two single-ended boilers, working at a pressure of 180lbs., and fitted with Howden's forced draught. The guaranteed speed is 12 knots. The vessel and her machinery have been superintended during construction by Mr. William Gray, naval architect, London.

Barley Rig.—Messrs. Herd & Mackenzie, Findochty, launched recently a fishing steamer named the *Barley Rig* which they have built for Messrs. Smith, Ianstown, Buckie. The vessel, which is 86ft. in length, will be supplied with triple-expansion engines by Messrs. Lewis & Sons, Aberdeen.

Hopper Dredger.—On May 9th, Messrs. William Simons and Co., Limited, Renfrew, launched, complete with all machinery on board, and with steam up ready for trials, a 700-ton hopper steamer, being the first of a fleet of eight dredging vessels they have on hand for the Naval Port, "Emperor Peter the Great," now under construction at Reval by the Imperial Russian Government for warship purposes. The vessel is propelled by compound surface condensing marine engines, supplied with steam from mild steel horizontal multitubular boilers constructed for a working pressure of 180lbs. per square inch. Powerful steam gear is provided for rapidly raising and closing hopper doors. The vessel has been built under the survey of Bureau Veritas for classification in their registry, and under the inspection of Captain M. A. Schmidt, I.R.N.

Innistrahull.—On May 9th, Messrs. Wm. Chalmers and Co., Rutherglen, launched the oil-engined coasting vessel *Innistrahull* which they have built for the Coasting Motor Shipping Company, Glasgow. The vessel is 115ft. in length, 21ft. 6in. in breadth, 10ft. 6in. in depth, and of 375 tons gross. The engine, which is to be of 230 b.h.p., will be supplied by Messrs. Wm. Beardmore & Co., Dalmuir. The *Innistrahull* is a sister ship to the *Innisshannon,* which was launched in March from the same yard, and like her is classed with the British Corporation.

LAUNCHES—Irish.

Patuca.—On April 26th, the new twin screw steamer, *Patuca* was successfully launched from Messrs. Workman, Clark & Company's South Yard, Belfast. The *Patuca* has been built for Messrs. Elders & Fyffes, Limited, London, and is a sister vessel to the *Patia,* which left Belfast recently, and intended for their general fruit carrying and passenger service between British and West Indian and Central American Ports. The new vessel is 432ft. in length, with a gross tonnage of about 6000 tons, and has been built in compliance with the British Corporation Registry of Shipping and the British Board of Trade requirements. Excellent accommodation for first-class passengers is provided in large staterooms arranged for one and two persons. A number of these rooms are so arranged with communicating doors and lavatories as to be available for use as family suites if required, and they are all comfortably and tastefully furnished. The public rooms comprise a spacious dining saloon furnished with small tables and comfortable movable chairs; a luxurious music room, and a handsome smoke room. The furnishings and decorations of all the private and public rooms present an admirable blending of comfort and artistic taste. The cargo spaces are divided into six compartments insulated and otherwise arranged for the

carriage of fruit in bulk. This cargo will be preserved during the voyage by cooled air delivered from the cooler rooms by ducts to each compartment. The propelling machinery consists of two independent sets of triple expansion engines of approved design, with the necessary auxiliary appliances, steam being supplied from four steel cylindrical multitubular boilers working under forced draught.

Andes.—On May 8th, the large mail and passenger steamer *Andes*, constructed for the Pacific Steam Navigation Company by Messrs. Harland & Wolff, Ltd., was successfully launched at Belfast. The *Andes* is nearly 600ft. long by 67ft. beam, and will be about 15,300 tons gross. She is a triple screw vessel, and will have a combination of reciprocating and turbine engines. To meet the demands of the frozen and chilled meat trade the *Andes* will be fitted with extensive refrigerating machinery. The most interesting feature, however, of the new ship will be the luxurious and commodious character of the passenger accommodation. In the first class there will be suites de luxe, consisting of bedroom, sitting room and bathrooms; intercommunicating state cabins with bathroom attached; and a large number of single and double berth rooms, many of which will be fitted with bedsteads instead of berths. Most of the inside cabins will be arranged on the tandem principle, thus giving natural light and ventilation to them. All cabins will be tastefully decorated, well ventilated, and fitted with electric light and fans. The dining saloon will be beautifully decorated in white and gold, and fitted with small tables on the restaurant style to accommodate over 380 people. There will be a children's saloon adjoining the main saloon. The two smokerooms will be richly upholstered, and in addition to the handsomely decorated social hall there will be daintily furnished ladies' boudoir. The *Andes* will be fitted with a passenger lift serving five decks, gymnasium, barber's shop, dark room for photography, cloak room, enquiry office and servants' rooms. The promenade decks will be spacious and all that can be desired. Special attention is also being paid to the second and third class accommodation, which will be a distinct feature of the vessel, which will also be fitted with wireless telegraphy and submarine signalling apparatus.

TRIAL TRIPS.

San Fraterno.—The s.s. *San Fraterno*, which was launched from the Wallsend Shipyard at the end of last February, has successfully run her trials at sea. The owners were represented by Major W. A. Adam, Captain Godfrey-Faussett, R.N., and the Hon. B. Clive Pearson, directors of the Eagle Oil Transport Co., Mr. Frank Rendall, manager, Captain Cox, Mr. John Gray and also by Mr. Barringer and his assistant, Mr. Walter Bradney, of Messrs. Jacobs & Barringer, the owners' consulting naval architects and engineers. A number of other guests were present, including representatives of many London and provincial newspapers. The *San Fraterno* has been built on the Isherwood system with longitudinal framing, and to the highest class of Lloyds under special survey. Her overall length is 542 feet and breadth 66½ feet, and she carries 15,700 tons of oil. The builders have two more of these great ships under construction, together with some other 9,000 tonners, all for the same owners. The Wallsend Slipway & Engineering Co. have built the quadruple-expansion engines and boilers. The latter are fitted for burning oil fuel by means of the well-known and highly successful Wallsend-Howden patent system. The pumping plant for the liquid fuel is in a separate chamber, thus keeping the stokehold clear as far as possible of oil fuel pipes and fittings. During the trial trip the *San Fraterno* was fully loaded and the mean speed was nearly twelve knots an hour, which is in excess of contract requirements. At each end of the range of oil holds there is a cofferdam. The oil holds are divided by transverse bulkheads into fourteen compartments and are further sub-divided by a central longitudinal bulkhead. In the bridge house amidships there is comfortable accommodation for the captain and his officers. Wireless telegraphic apparatus is fitted and in every detail of design and outfit, in the main engines, pumping plant and auxiliary machinery the *San Fraterno* may be said to represent the most modern and improved type of ship for carrying oil in bulk. Captain MacKenzie took charge of the ship after the trial trip and proceeded to the River Thames, prior to going to Mexico. For Launch, see April issue

Renteria.—On Friday, April 18th, Messrs. Osbourne Graham & Co., sent to sea for her official trial the steel screw steamer, *Renteria*, which they have specially constructed to the order of Messrs. Fearnley & Eger, of Christiania. This is the sixth vessel they have constructed for this firm and the third of the Monitor type. During the trial every thing was quite satisfactory to all concerned. For launch see May issue.

Clarissa Radcliffe.—On April 19th, the s.s. *Clarissa Radcliffe*, built by Messrs. Craig, Taylor & Co., Ltd., Thornaby Shipbuilding Yard, Stockton-on-Tees, was taken to sea for her loaded trial trip from the Tyne, which proved highly satisfactory. Immediately after the trial the vessel left for Port Said under command of Captain Nathias. This is the fourth sister vessel which Messrs. Craig, Taylor and Co., Ltd., have lately built for the same owners. For launch see March issue.

Salamanca.—On April 21st, the new steel screw steamer, *Salamanca*, built by Messrs. Wood, Skinner & Co., Ltd., Bill Quay-on Tyne, to the order of Mr. Otto Thoresen, of Christiania, for the Canary Islands Fruit Trade, left the Tyne for her official trial trip. Throughout the trials the machinery ran splendidly, a main speed of over 11 knots being maintained, which gave great satisfaction to all concerned. For launch see April issue.

Patia.—On April 23rd, this new twin screw steamer left Belfast Harbour and steamed down the Lough to Carrick Roads, where compasses were adjusted, after which the vessel left for Glasgow to take in coal in preparation for speed trials and machinery tests on the Clyde. For launch see March issue.

Nestor.—On April 28th, the new twin screw steamer, *Nestor* left Belfast Harbour and proceeded down Belfast Lough to Carrick Roads, where the operation of adjusting compasses was carried out, the vessel afterwards having a series of runs on the measured mile course. The results of these trials were of the most satisfactory character, and the vessel afterwards left for Glasgow to take in cargo and afterwards to call at Liverpool to take in bunkers, complete cargo, and embark passengers for the initial voyage to Australia, via the Cape. For launch see January.

Wagama.—On April 29th, the steel screw steamer, *Wagama*, built by Sir Raylton Dixon & Co., Ltd., at their Cleveland Dockyard, Middlesbrough, to the order of Mr. Ragnvald Blakstad, on behalf of the Aktieselskabet "Asker," Christiania, proceeded to sea for her official trials. The trials passed off most successfully, and the vessel returned to the Tees to sail for Wabana under the command of Captain Ostervold. The hull and machinery have been constructed under the supervision of Captain Harboe Jensen, the owners' superintendent, and Messrs. C. A. Bushell, Nicol & Co., of Newcastle-on-Tyne. For launch see April issue.

Queensland Transport.—On April 30th, the s.s. *Queensland Transport*, ran her official trial trip in Hartlepool Bay. Throughout the trial the engines and all auxiliaries worked very satisfactorily, a speed of 12½ knots being attained, and the vessel afterwards proceeded on her voyage to Barry. For launch see March issue.

Digby.—On April 30th, the s.s. *Digby*, proceeded on her official trial trip. The *Digby* is a steel screw passenger and cargo steamer, built by Messrs. Irvine's Shipbuilding and Dry Docks Co., Ltd., West Hartlepool, for Messrs. Furness, Withy & Co's. North Atlantic Passenger, Fruit and General Cargo Trade. Throughout the trial the engines and all auxiliaries worked admirably, and on a number of runs North and South on the Whitley Bay measured mile a speed of 15¼ knots was attained. For launch see January issue.

Kyle.—The mail steamer, *Kyle*, which has been built at the Neptune Works of Messrs. Swan, Hunter & Wigham Richardson, Ltd., to the order of the Reid Newfoundland Company, of St. John's (N.F.), went for a very successful trial trip. The steamer is a finely modelled screw vessel of 220ft. in length by 32ft. beam, exceptionally strongly constructed for running through ice, which she will often meet on her mail and passenger service on the Newfoundland and Labrador coasts. The accommodation for the first-class passengers is amidships. The second-class passengers are placed aft, in two compartments on the main deck. The steamer is provided with a complete installation of electric light, including a searchlight, an efficient arrangement of

steam heating suitable for the climate, and wireless telegraphy. The propelling machinery consists of a set of triple-expansion engines, supplied by steam from two large boilers working under forced draught, the whole having been constructed at the Neptune Works. On the trial the machinery worked without the slightest hitch, giving satisfaction to all concerned, and driving the vessel at a speed of 13¾ knots per hour. The owners were represented by Mr. R. G. Reid, one of their managing directors, and the builders by Mr. G. F. Tweedy. Messrs. Wailes, Dove & Co.'s "Bitumastic" solution was applied throughout the bunkers and their patent "Bitumastic" Covering to the tank tops.

Karroo.—On May 6th, the large screw steamer, *Karroo*, built at the Hebburn shipyard of Messrs. Palmers Shipbuilding and Iron Company, Ltd., to the order of the Bucknall Steamship Lines, Ltd., was taken to sea for a trial trip. The vessel, which is about 450ft. long, is designed for carrying general cargo, her deadweight capacity being about 10,000 tons. The trial was satisfactory in every respect, the engines and ship behaving very well, in spite of the heavy weather which prevailed. There were present on behalf of the owners Mr. A. Dalyrmple and Mr. A. Rennie. The builders were represented by Mr. J. H. Hutchinson, Mr. J. McFarlane, and Mr. J. W. Reed. For launch see May issue.

Kristianiafjord.—On May 10th, the new Norwegian steamer, *Kristianiafjord*, built by Messrs. Cammell, Laird and Co., at their Tranmere Bay yard, to the order of the Den Norske Amerikalinje, of Christiania, went on her preliminary trial run in the Mersey Channel. The vessel left the dock at 12-30 p.m., with a company of guests representing the owners and the builders. The trials were gauged on a six hours' full speed run between the North-West Bar lightship, when it was found that the boat had come up to the contract speed. The owners were represented on the trial by Mr. J. Vogt, Liverpool agent for the company; Mr. G. R. Brace and Mr. Wm. Gray, of Messrs. Gray, Brace and Co., naval architects; Mr. Caro Brath, supervising engineer; Captain H. D. Doxrud, general superintendent; Captain Hjortdahl, master of the vessel; and Mr. Bang. For launch see January issue.

Malda.—The new British India steamer, *Malda*, which has been built at Whiteinch, has recently run successful trials on the Clyde. The *Malda* is intended for the London and Calcutta service of the company, and has large first and second-class passenger accommodation. She is 450ft. in length, 58ft. in beam, and of 8200 tons gross and 11,000 tons cargo capacity. On the measured mile she maintained easily a speed of 13¾ knots, the machinery running very smoothly. The *Malda's* passenger accommodation is exceptionally commodious and comfortable, and her passenger decks are very extensive. One of her features is the "Inchcape" cabins—patented about a year ago by Lord Inchcape, the chairman of the British India Line. Each of these inside cabins has a large, broad passage from the centre of the cabin to the side of the ship and leading to a large port, giving as much light and air as if the cabin itself were at the ship's side. Lord Inchcape was on board during the trials, and expressed himself as thoroughly satisfied with the vessel. The *Malda* is the first of a number of her class which are now under construction for the British India service from London to Calcutta, to Kurrachee and Bombay, and to East Africa and Durban.

Rosalind.—Trials have recently been run of the new oil-tank steamer, *Rosalind*. This vessel has been constructed on the Isherwood system of longitudinal framing by Messrs. Swan, Hunter, and Wigham Richardson, Ltd., Wallsend, for the Oil Tank Steamship Company, Ltd. During the trial trip off the mouth of the Tyne coal was used. Everything worked without a hitch and to the entire satisfaction of the owners. The ship was fully loaded, and a speed of considerably over 11 knots an hour was obtained. For launch see May issue.

Tiara.—The steamer, *Tiara*, built at Sunderland for Messrs. Wall Brothers Steamship Co., Ltd., was recently taken to sea on her official trial. Owing to the unfavourable weather conditions, speed trials were impossible, but during the run round to the Tyne, where the vessel is to load her cargo, everything worked most satisfactorily. The ship, which is 360ft. long, takes Lloyd's highest class under special survey. The main engines have cylinders 25, 42 and 68in. by 45in. stroke, steam being supplied by two large boilers working at a pressure of 180lb. per square inch.

Noorderdyk.—On May 10th, the handsome steel screw steamer, *Noorderdyk*, built by Messrs. Wm. Gray & Co., Ltd., for the Holland-America Line, Rotterdam, had her trial trip. The owners were represented by Mr. H. van Helden (naval architect and marine superintendent, under whose superintendence the ship and machinery have been built), and Mr. Muschart, their nautical superintendent. After the usual manœuvring for adjustment of compasses the engines were opened out for full speed trials, which were made under somewhat unfavourable weather conditions, but with very satisfactory results, the average speed maintained being 14 knots. The vessel afterwards proceeded on her voyage to Rotterdam. For Launch see April issue.

Trevider.—On May 14th, the new screw steamer, *Trevider*, built by Messrs. John Readhead & Sons, Ltd., West Docks, South Shields, to the order of Messrs. Edward Hain and Son, St. Ives, Cornwall, was taken to sea on her official trial trip. The trial was in every way satisfactory to all concerned, and the vessel will load for Port Said, under the command of Captain Williams. This is the sixty-second vessel built for the above firm by Messrs. John Readhead and Sons, Ltd. For launch see May issue.

Phidias. On May 15th, the new steamer, *Phidias*, 430ft. by 56ft. by 30ft. 9in., the second of two vessels, which Messrs. Arch'd. McMillan & Son, Ltd., Dumbarton, have built for Messrs. Lamport & Holt, Ltd., Liverpool, ran successful trials on the Firth of Clyde. The machinery was supplied by Messrs. David Rowan & Co., Glasgow. For launch see May issue.

Zeta.—On May 17th, the steel screw steamer *Zeta* ran her official trial trip in Hartlepool Bay. The vessel has been built by Messrs. Irvine's Shipbuilding & Dry Docks Co., Ltd., West Hartlepool, for B. J. van Hengel, Esq., Amsterdam. The dimensions are 342 ft. by 48 ft. by 24 ft. 6½ in. depth moulded, having a dead weight capacity of over 5,300 tons. Throughout the trial the engines and all auxiliaries worked admirably, the owners' representative, Mr. J. F. van Hengel, expressing entire satisfaction, and a speed of 12 knots was attained, the vessel afterwards proceeding on her voyage.—For Launch, see May issue.

Donald Sutherland.—Edward Hayes, of Watling Works, Stony Stratford, has recently run the trials of the new steel steam tug *Donald Sutherland*, a repeat order of the *Edith Callaghan*, which he also built this year for Buenos Ayres. She is 51 ft. long, 11 ft. wide, and draws a little over 4 ft. of water. She is designed to pass under bridges having only 6 ft. headroom from the water line. The machinery consists of an Ard type Hayes C. S. C. engine, having cylinders 8 in. and 16 in. by 10 in. stroke. Steam is supplied by a large marine return-tube boiler, built under Lloyd's Survey for 120 lbs. w.p. On the trials the purchasers were represented by their engineer, Mr. H. Hudson, and Mr. Newburn Hall, and the builders by Mr. Arthur Hayes, A.M.Inst.N.A.

Wearpool.—On May 16th, the s.s. *Wearpool*, built by Messrs. Ropner & Sons, Limited, of Stockton-on-Tees, made her official trial trip in the Tees Bay. The steamer has been built to A1 at Lloyd's and is for Messrs. R. Ropner & Co., of West Hartlepool. She is about 403 ft. long and has a deadweight carrying capacity of about 8,825 tons. Her outfit is thoroughly up-to-date, and includes stockless anchors, quick warping windlass, steam steering gear amidships and powerful screw gear aft, whilst she is particularly well-equipped with derricks and winches of the most modern type in order to facilitate the loading and discharging of heavy cargoes. The accommodation for captain, officers and engineers is in houses on bridge, with crew in the forecastle. The engines are of the triple-expansion type of about 2,630 i.h.p. having three steel boilers 15 ft. 9 in. by 11 ft., working at 100 lbs. pressure of steam, being built by Messrs. Blair & Co., Ltd., Stockton-on-Tees. The vessel has been built under the superintendence of Mr. J. Nicholson, and on her trial behaved in a thoroughly satisfactory manner. The owners were represented by Mr. J. Nicholson and the builders by Mr. J. R. Garthwaite. After some very satisfactory trial runs, during which the vessel attained a speed of over 12 knots, she proceeded to Montreal.

Delta II.—Recently the *Delta II.*, the new motor-engined fire-float for the London Fire Brigade, was put through her trials and demonstrated her water throwing powers on the

Thames. This vessel, which is engined with powerful Kromhout motors, has been built at Cowes, Isle of Wight, by Messrs. J. S. White & Co. She will be stationed at Battersea and will undoubtedly prove a most useful addition to London's fleet of fire subduing craft. The builders were represented at the trials by Mr. E. C. Carnt, their managing director, while Mr. Perman was present on behalf of the engine builders. She is a fine looking craft and measures 100 ft. in length, and has a beam, extreme, of 21 ft. In order to carry out the special requirements of the London Fire Brigade river service she has a draught, with equipment, stores and fuel on board, of only two feet. Her propelling machinery consists of three Kromhout paraffin engines, by Messrs. Plenty & Son, Ltd., of Newbury, driving three screws in tunnels. She is the second vessel to be so built, the first having been sent out last year for the use of the Foreign Office abroad. The trials of the vessel gave extremely satisfactory results, a speed of over 10 knots being maintained, while her manœuvring powers are also very good. Her three powerful fire pumps deliver either through eight hose connections on deck or through a central monitor, as may be desired. These pumps are direct-driven by the main propelling engines, and are capable of discharging nearly 6½ tons of water per minute. The arrangement adopted gives a large range of power, both for pumping and propelling purposes, either one or two engines being available for propelling, leaving the other two (or one as the case may be) for working the pumps. The float is also fitted with large suction pipes on each side, with fittings on deck to take suction hoses of large diameter for salvage purposes. In addition to this main machinery, the vessel has also two combined sets of dynamos and air compressors, driven by paraffin engines, and a separate auxiliary engine driving a bilge and general service pump, capable of discharging over 3,000 gallons per hour, with suctions from all main compartments. Abaft the fore-peak, and divided from it by a water-tight collision bulkhead, are the two chain lockers; aft of these there is a large general store. There is a fine hose room, with special racks for hoses, nozzles, lamps and various other fittings. Aft of the machinery space is a large mess-room and abaft this again are the galley and mess-room store. All the main compartments are divided from each other by watertight bulkheads, and all are heated by a very efficient system of hot-water radiators supplied from a boiler in galley. The vessel is lighted throughout with electric light.

Abridgments of New Patents.

Compiled by Messrs. E. P. Alexander & Son, Chartered Patent Agents, 306, High Holborn, London, W.C.

453. Lubricators. A lubricator for the cylinders, pistons and slide-valves of steam engines is operated by the difference of pressure between the boiler and the steam-inlet to the

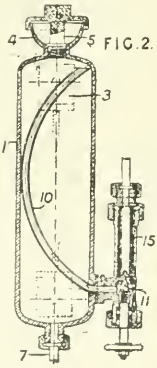


FIG. 2.

slide-valve. Water from the boiler enters an oil-vessel 1 through a pipe 7, and oil is forced down a curved pipe 10, past a needle valve 11, and through a sight-glass 15 containing water, to the steam-inlet pipe. The oil enters this pipe at a point between the steam-chest and the stop valve of the engine, and as near as possible to the slide-valve casing, into which the oil is carried by the steam. The upper part of the vessel 1 is provided with a boss fitted with a glass window 3, and has a filling funnel 4 and plug 5.

527. Oil Fuel Burners. In apparatus for preheating by steam the fuel of oil fired steam-generators, the oil is maintained at a substantially constant temperature by means whereby the level of the water of condensation within the heater may be raised or lowered according to the rate of consumption of the fuel in order to vary the heating surface exposed to the action of the steam. The oil outlet *g* from

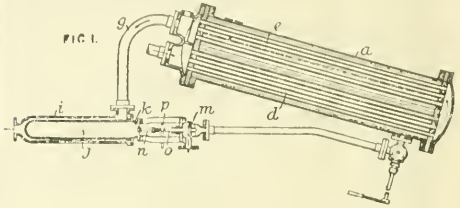


FIG. 1.

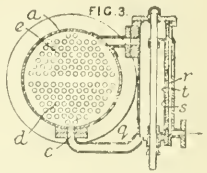


FIG. 3.

the heating-chamber *a* leads to a casing *i* which surrounds a chamber *j*, containing an expansible fluid and closed by a flexible diaphragm *k*. The outlet for the condensed steam from the chamber *a* is controlled by a valve *m* which is connected by a rod *o*, *n* to the diaphragm *k*, so that any change in the temperature of the oil will vary the rate of leakage of the water of condensation and consequently the surface of the oil-tubes *d*, *e* exposed to the steam. The parts of the rod *o*, *n* are separated by a wedge *p* which can be adjusted to vary the length of the rod. In the modification shown in Fig. 3 the outlet *c* is connected to a cylindrical valve casing *q* having an outlet in the form of a vertical slot *r*. In the casing *q* is mounted a segment of a cylinder *s* having an outlet in the shape of an inclined slot *t*, so that when the cylinder *s* is rotated the point of intersection of the slots *r*, *t* will be varied, and hence the water-level in the chamber *a* will be correspondingly raised or lowered. In a modified construction in which the heater is vertical, a series of outlets is provided so that the level of the water within the chamber *a* can be maintained at any one of several definite levels.

OBITUARY.

Charles B. Connell.

The death of Mr. Charles B. Connell, head of the shipbuilding firm of Charles Connell & Co., Scotstoun, took place with distressing suddenness in a Nursing Home in Glasgow on May 23, where he had undergone, a few days previously, a surgical operation. Deceased, who was about sixty years of age, was a son of the founder of the firm, Mr. Charles Connell, whose business at first was conducted in a small yard in the Kelvinhaugh district, now absorbed in the harbour of Glasgow. Mr. Charles B. Connell was identified all his life with the conduct of the enlarged business at Scotstoun and was responsible for the output of a large number of steamships for well-known companies. The firm did not undertake the making of engines and boilers and it is a melancholy coincidence that the engineering firm with whom Messrs. Connell and Co., chiefly co-operated was that of Messrs. Dunsmuir and Jackson, whose principal, Mr. Hugh Dunsmuir, passed away three weeks ago, as stated in an obituary notice elsewhere. Mr. Connell took no active share in the deliberations of the professional Institutions, but concerned himself very closely with the work of the employers' organizations.

The Marine Engineer

And Naval Architect.

LONDON, JULY, 1913.

THE KING'S BIRTHDAY HONOURS.

IT has been a matter of surprise and regret that in the past the shipbuilding industry, apart from the official side of the Government, has received very little in the way of the distribution of honours among those who have rendered distinguished service to, or have been pioneers in, this important branch of the nation's industrial life. It is, therefore, with more than ordinary satisfaction and pleasure that the shipping community received the intimation of the distinction which His Majesty has graciously conferred upon some eminent representatives of the shipbuilding and ship-owning interests. We desire to extend our congratulations to all the recipients of these honours and to express our appreciation of the fact that they were in every case well deserved.

We feel sure that everyone will acclaim the worthiness of Sir Archibald Denny for the baronetcy conferred on him, not only on account of his high scientific attainments and great business capacity, but also as being a distinguished representative of a family which has for so long occupied such an important position in the shipbuilding industry of the United Kingdom. Sir Archibald has, owing to his wide knowledge of technical matters, occupied many important positions in the past, among which may be mentioned the Presidency of the Institution of Engineers and Shipbuilders in Scotland, and of the Junior Institution of Engineers. He is a member of the Council of the Institution of Naval Architects, a member of the North-east Coast Institution of Engineers and Shipbuilders, and of the Associated Technique Maritime, a Fellow of the Society of Arts and of the Royal Society of Edinburgh, and an ex-chairman of the Technical Committee of the British Corporation Registry of Shipping. He is the Chairman of the Committee on Bulkheads and Watertight Compartments, which is at present sitting, and is a member of the recently appointed Board of Trade Load Line Committee, and has served on various Board of Trade committees in the past. The Glasgow University conferred on him the honorary degree LL.D.

Another recipient of a baronetcy is Sir William Vestey, who, beside being the head of the Blue Anchor Line, is the managing director of the Union Cold Storage Company. A third recipient is Sir Stephen Wilson Furness, M.P. for the Hartlepools and a nephew of the late Lord Furness. He is chairman of Furness, Withy & Co., Ltd., the Neptune Steam Navigation Co., and the South Durham Steel and Iron Co., and is connected with Messrs. Irvine's Shipbuilding Co. No one will be surprised at the fourth honour, *viz.*, a knighthood to the Professor of Naval Architecture in the University of Glasgow, Sir John Harvard Biles, LL.D. He was educated at the Royal School of Naval Architecture and Marine Engineering and at the Royal Naval College, Greenwich, and is a vice-president of the Institution of Naval Architects, a member of the Institution of Engineers and Shipbuilders in Scotland, the Institution of Mechanical Engineers, the Society of Naval Architects and Marine Engineers of the United States, the Japanese Society of Naval Architects, the Royal Corps of Naval Constructors, and a Past-master of the Worshipful Company of Shipwrights. Besides being an author of many of the standard works on naval architecture, by which his knowledge and technical skill is well known, Sir John Harvard Biles will be better known to the general public as having served on many Government committees, for instance, the Boats and Davits Committee, of which he is chairman, and particularly that Committee which enquired into the loss of the *Titanic*. From the above it will be seen that the honours are distributed very fairly among three distinct classes of shipbuilding interest.

SHIPBUILDING CONTRACTS.

ONE of the most interesting papers read at the summer meeting of the Institution of Naval Architects last month was on the subject of shipbuilding contracts, and having regard to the importance of this subject and to the close bearing that it has on the commercial value of a ship as a profit-earning factor, we think that it is desirable that the subject should have the fullest consideration. It was pointed out by the author, Mr. L. Peskett, that the relationship that exists between the shipowner and the shipbuilder is one of peculiar interest to the naval architect, as the enterprise of the owner has a considerable influence on the activity of the builder. The naval architect, therefore, in acting as the technical intermediary between the owner and builder, has a very onerous and anxious duty to perform, as on the one hand he has to deal with the realization of the ideals of the owner, associated as they often are with the dread of expenditure, and on the other hand he has to obtain from the builder a ship complete in all its details and of commercial value represented by the amount of money expended by the owner. It will thus be seen that the maintenance of the cost of production within reasonable limits is of a vital importance to both interests involved, and it must be remembered that the importance does not remain solely with the owner and shipbuilder, but forms part of a very much larger question which is of national importance—the efficiency of our productive machinery as a trading nation. The author draws a very interesting comparison between the conditions which obtain in the erection of a building and those which usually obtain in the building of a ship. As is well known, when a building is to be erected the plans and specification are prepared by an architect, and after approval, a bill of quantities is got out by a quantity surveyor, and subsequently prices are obtained for the supply and erection of the various portions of the work based on some standard of measurement. During the progress of the building the owner may decide to add to or take away from any of the scheduled items, with the knowledge that there will be a corresponding addition to or reduction in the final cost, for when the building is completed the actual amount of work done by the builder is measured by the quantity surveyor, and payment is made on this basis at the rate previously agreed upon in each particular item of expenditure. In the matter of building a ship the object of

the owner is the same as that of the person building a house, *viz.*, to obtain the best revenue-producing asset it is possible to get for the sum he intends to invest. In the case of the ship, it is well known that the leading shipowning companies prepare their own plans and specifications upon which builders are invited to tender, so that the tenders when received are readily comparable, being prepared upon a common basis. The contract specifies a certain fixed sum to be paid for the construction of a ship of given dimensions and speed in accordance with the requirements of the owner and the regulations of a particular registration society. Having regard to the want of flexibility in the latter method, it is desirable to ascertain whether there is any reason why the latter method should not be discarded and the method adopted by the owner of a building as previously indicated substituted therefor. One of the difficulties under which the present system of contracting labours, is that each firm has its own particular method of preparing its own estimates, and, therefore, the estimates from the various firms tendering are not submitted upon any standardized basis, so as to make all the tenders comparable with one another in detail, with regard to any additions or reductions in the cost of the various items owing to variation of the original amount. The author, therefore, suggests that some plan should be devised under which the various tenders could be submitted on a standard basis similar to that adopted by the architect and quantity surveyor. To give a practical illustration of his scheme he suggests, for example, that all the items in connection with the cost of material and labour, establishment charges, profit and margin, should be scheduled, and a total sum defined as the maximum price which the owner would be required to pay. It will be seen that if the margin on direct outlay and the establishment charges and the nett profit were agreed upon as a fixed sum, it would be a direct advantage to both owner and builder to keep the costs as low as possible, and as these items do not alter, the builder will make the same profit on a small turnover, while any reduction in the nett cost of material and labour from the amount originally fixed makes a corresponding reduction in the cost of the vessel to the owner. As illustrating that this scheme can be practically carried out and good results obtained thereby, the author cites the case of the Cunard Company's vessel *Franconia*, built by Messrs. Swan, Hunter & Wigham Richardson, Limited, in which case a contract was made for a fixed sum to be spent to complete the ship in a given time, but after the contract was signed it was suggested that the ship might be built on the scheme outlined above, the fixed price originally quoted being considered to be the maximum payable by the Cunard Company, and this course was carried out. The result of this altered procedure was that, upon the completion of the contract, the builders handed to the owners a rebate of £20,000 on the sum originally fixed. This interesting result gave satisfaction to all concerned, and the builder obtained the original profit provided for, while the rebate was accounted for in the saving on material and labour mutually agreed to during the construction of the ship. In fact, it may be argued with logical soundness that the builder made a proportionately larger profit than under the initial conditions, as he made the same profit on a smaller turnover. The author sets out in interesting tables the sub-division of expenditure under various heads, which are classified under four general sections, *viz.*, direct outlay, establishment charges, scheduled items, builder's profit.

Space precludes us from dealing with the scheme in detail, but anyone interested in the matter can obtain all the information from a study of the paper itself, however we have outlined the matter sufficiently to show its commercial and national importance. We may conclude, however, by agreeing with the author that the mode of contracting suggested will certainly stimulate the business capacity of the builder, for the amount of profit and the amount paid to cover establishment charges is assured to him, and consequently it is to his particular interest to do all he can to keep down the actual charges. It may be stated that the builder's risks are mainly taken when he is agreeing to contract rates for wages, but he will recognise that it will be in his best interests, as well as in the interests of the country, that the cost of production should be kept as low as is reasonable, if contracts are not to be placed elsewhere, and it follows that any scheme which enforces constant activity on the builder in this direction is fundamentally sound.

ENGINEER'S SCHOLASTIC AND PRACTICAL EXPERIENCE.

THE effects of the new Board of Trade Regulations, which come into force in 1915, and their probable bearing upon the rising generation of marine engineers are exercising the minds of many who are interested in maintaining the highest standard of excellence possible, consistent with the conditions ruling the supply of marine engineers to meet the demand; conditions which tend to keep the standard at a general rather than a particular average.

It is well that holders of certificates should look carefully and cautiously into proposed changes in the regulations dealing with the examinations and service required for future candidates, even to the extent of viewing such changes with suspicion, in order that they may not be carried away by an apparent glamour, cast mayhap by an adventitious light. It may be stated that for practical experience which is absolutely necessary to equip an engineer for his duties in the engine-room, whether on land or sea, there can be no equivalent substitute, and the extension of qualifying time made a few years ago, from three to four years' workshop training as a minimum of practical experience, added to twelve months' watch-keeping experience at sea, before candidates could be accepted for examination by the Board of Trade to obtain a second-class certificate, was undoubtedly hailed as a good step and in the right direction, involving no hardship on candidates and giving better men to the service of the steamship owner. The extension of watch-keeping sea service in the amended regulations from twelve to eighteen months has been pretty well discussed and agreed to as desirable and necessary, in view of the increased machinery fitted in the steamship of to-day compared with its predecessor of even ten to twenty years ago. The optional substitution of not more than one-sixth of the total sea service in the ratio of three to two, of regular and consistent attendance at an approved technical school is not looked upon with

favour in many quarters, mainly on the ground that as practical service in the workshop is the groundwork of training for the engine-room, so watch-keeping service at sea is the groundwork of training for the certificated engineer, and there can be no fitting substitute for either. This may be agreed to in the main, and it may also be agreed to that encouragement should be given to those engineers who desire to add scientific attainments to their practical experience, but it is not clear what class of technical college or school comes under the category of approved; hence uneasiness has been created in view of the efforts being made by Council Schools to induce boys as well as apprentices to enter upon an engineering course of study and reduce their workshop service. Some of the technical schools have inaugurated a course of day classes especially for boys from 13 to 16 years of age, who are looking forward to serving an apprenticeship; others again, finding a difficulty in securing a regular attendance of apprentices at the night classes, are considering the establishment of day classes for apprentices who may be allowed to attend two afternoons or one day per week, so that they may be taught theory and its application to their every-day practical work. The question of what, if any, allowance would be made for such attendance in lieu of practical workshop service is mingled with other proposed encroachments upon the all-important finger-end experience. Theoretical knowledge gained by a course of consistent study and close attention is undoubtedly good in the brain of a practical man; it will enable him to control details with better advantage, and such a course should be encouraged, rather than a nibbling process which has no particular end in view save the substitutionary one for the student, and for the school the desirability of earning grants, an aim which unhappily has been brought into prominence occasionally as a be-all and end-all of the teaching staff rather than the more noble and inspiring desire to make the best of the material supplied for training to the highest advantage. The important point in connection with the regulations is the substitution of a school for the engine-room training even for three months. The value of a chief engineer's certificate in the eyes of those who desire his services is based upon the status its possession gives him as a thoroughly trained, practical engineer who has qualified for examination by a lengthened experience and service in the engine-room, and any element which may tend to disturb that view or may seem to lower that status requires the utmost consideration.

LUMITE.

Our attention has been called to a new alloy, which has the appearance and the lightness of aluminium, but has advantages not possessed by that material. It is characterized as non-magnetic, free from copper, zinc, manganese, silicon and iron; while it can be soldered, welded or brazed and can be remelted and cast without losing any of its qualities. For drawing into tubes or rolling, the sp. gr. of the metal is 2·75, with a tensile strength of 24 tons, and elongation of 10% in 2". It resists the action of acids, sea water and other corrosives. The sp. gr. of the cast metal is 2·78, tensile strength 11 tons, elongation 7% in 2", or where a higher tensile strength of 12 to 13 tons, elongation 6%, the sp. gr. is given as also 2·78. In melting the metal the heat should not exceed 750° C. It takes on a good polish and has a good appearance for saloon and cabin fittings. It may also prove of service in connection with electrical and even general engine-room fittings.

THE INSTITUTION OF NAVAL ARCHITECTS.

THE joint summer meeting in Glasgow of the Institution of Naval Architects and of the Institution of Engineers and Shipbuilders in Scotland was opened on the 23rd of last month by a reception by Mr. E. Hall Brown at the rooms of the latter Institution, which was attended by a large number of ladies and gentlemen. During the visit (which ended on the 27th of June) of the Naval Architects to Scotland, the members and friends of both Institutions paid visits to the works of several firms upon the invitation of the proprietors. On the evening of the 24th June a reception was held in the City Chambers by the Right Hon. the Lord Provost of Glasgow (D. M. Stevenson Esq.), and a dinner was given on the 25th at the Grosvenor Restaurant, Gordon Street, on the invitation of the Scottish Institution. On the 26th a ball was given in the St. Andrew's Hall, Glasgow, members of both Institutions and guests being received by the Right Hon. Lord Inverclyde and members of the Reception Committee.

Other events were arranged for the members and their friends, full information of which was given in the exhaustive and well prepared programme of proceedings issued by the Institution of Naval Architects. During the meetings a number of papers were read, which are now enumerated—"Shipbuilding contracts," by Mr. L. Peskett; "Safety of life at sea," by Mr. P. A. Hilhouse; "Fatigue in the steel material of steamers," by Mr. S. J. P. Thearle; "Effects of form and size on the resistance of ships," by Mr. G. S. Baker and Mr. J. L. Kent; "Experiments on suction or interaction between passing vessels," by Prof. Gibson; "Experimental determination of the effect of internal loose water upon the rolling of a ship amongst a regular series of waves," by Mr. A. Cannon; "The effect of water chambers on the rolling of ships," by Mr. Woollard; "On the criterion for the occurrence of cavitation," by Prof. Gümbel; "On the trials of three ferry steamers propelled by geared turbines," by Mr. J. Inglis; "A device to facilitate the coupling of cruising turbines," by Mr. H. E. Yarrow; "Performance on service of the motor ship *Succia*," by Mr. Knudsen; "A case for electric propulsion" by Mr. Reid and Mr. Mavor. We report two or three of the papers in the present issue, but owing to great pressure on our space, we are compelled to leave others over until another occasion.

An interesting event which should be recorded was the presentation by Signor Salvatore Orlando—on behalf of the Italian Society of Naval Architects and Marine Engineers—of a gold medal to the Institution of Naval Architects in recognition of its services to the science of naval architecture.

ELECTRIC PROPULSION.

Description of the "Tynemount."

THE development of the canal barge or freighter presents a problem of much greater interest and importance than may at first sight appear. Perhaps nowhere in the world is the influence of local conditions on vessel design more recognisable than on the Great Lakes of North America, where the immense quantities of bulk ore, coal and grain, which have to be handled in a short six months' season, the importance of quick loading and discharge, the shallow nature of the canals and river channels connecting the Lakes, and other local considerations, have led to the evolution of a very remarkable type of vessel, enormous in size, unique in proportions and unapproachable in the efficiency and economy of its operations. The same influence of local conditions on vessel design is very marked in the Canadian vessels which make use of the St. Lawrence and Welland Canals, by which access by water is maintained between the head of ocean navigation at Montreal and the end of Lake navigation proper at the eastern end of Lake Erie. This canal system comprises the range of canals by which vessels are enabled to pass the currents and rapids of the St. Lawrence River above Montreal, and the Welland

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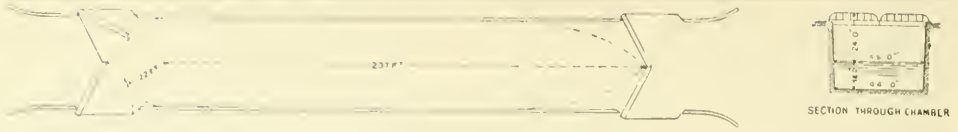


Fig. 1.—Welland Canal

NOTE.—The shape of the stern of a vessel regulates the extreme length that can be locked through. A narrow vessel can be longer than a wide one. A longer vessel can be locked down than up. No vessel should be over 44 ft. extreme width.

Canal, by which the difference in levels between Lake Erie and Lake Ontario, of which the Falls of Niagara is the outcome, is surmounted.

In this series of canals the limiting draught is 14ft. under normal water conditions, in many of the canal reaches as well as on the sills of the numerous locks. These locks themselves are for the most part of a standard size, Fig. 1, permitting the convenient passage of any vessel not exceeding 250ft. between perpendiculars, 42ft. 6in. beam over plating, and drawing not over 14ft. in fresh water. Larger vessels have been locked through, but only with difficulty, and for our present purpose it may be taken that the above dimensions cannot safely be exceeded. When it is considered that a Canadian canal vessel can only operate on the Lakes and canals for six months in the year, owing to prevailing ice conditions, and that for various reasons it is not possible to employ it during the off Lake season in any deep sea trade, and when it is remembered that the trades in grain, coal, pulp wood, package freight, etc., between Montreal and the Upper Lake ports, and *vice versa*, is already very large and rapidly increasing, it will be easily understood that not only is it of prime importance to carry the utmost possible deadweight per trip on the limiting draught of 14ft., but it is equally important to obtain quick loading and discharge and to lose as little time in negotiating the canals and locks of the St. Lawrence and Welland Systems as possible.

The last consideration is due to the fact that, as the speed in the canals is limited to four miles an hour, and as there is ever present in the canals the possibility of vexatious delay on account of passing vessels, railway swing bridges, waiting turn at locks, interference from fog or darkness when the main canals cannot be navigated, and so forth, the vessel cannot too quickly escape into the open water, where only can continuous navigation at full speed be carried on. Under these conditions it is fair to state that anyone starting out to design or build a canal vessel suitable for the Canadian trade, without reference to the local conditions, would be pretty certain to produce a failure, however successful the vessel might be in open water alone. For example, in attempting to enter a lock which is only 45ft. wide with a vessel which is 42ft. 6in. beam, and under which there may only be an inch of water over the canal bottom, it would be natural to expect that the navigating officer would arrange to approach slowly, pass lines ashore and gradually warp the vessel in. To follow such a course would probably obviate a good deal of canal damage which these vessels now sustain, but it would inevitably entail such a delay in the locks as would most seriously reduce the vessel's earning capacity. Actually the course followed is for the navigating officer, as he approaches each lock, to line up his vessel as well as wind and current will allow, and to enter at considerable speed, so as to displace the lock water past the vessel's sides as quickly as possible. Full stop a few feet short of the gate ahead is obtained by quick engine reverse, and by holding on with an extra heavy compressor to a snubbing wire made fast to a mooring pin on the quay. When the vessel has risen or descended in the lock, it is equally important to get under way again with the least loss of time, which is usually done by passing a mooring wire forward along the lock wall or canal bank and warping out for a short distance until the propeller can get the vessel up to the desired speed.

It will be at once apparent that under such conditions as outlined, the form of the propeller, its revolutions and its control must play a most important part in the efficiency of the vessel as a canaller. Engineers experienced in this line of work look for a screw which will cause this very full-formed vessel to respond immediately to its actions, and, of course, there goes with that an arrangement of propelling machinery which must respond immediately to the demands of the engineer in charge. A quick-acting throttle and an instantaneous and positive reverse are all important. These would be valueless, however, to the desired end but for a propeller which will enable the vessel to be driven into and out of a lock with the least loss of time. Bear in mind that in entering the lock there is a direct resistance from the water throttled in front of the vessel, and in leaving the lock a corresponding vacuum tendency behind the vessel, and a refusal of the water to flow quickly through the restricted channels between the vessel's sides and the lock walls towards the propeller. Evidently, for successful work under such peculiar conditions, everything depends on the propeller. Note that there is no question here of hull form; that is to all intents and purposes fixed and unalterable. It will be understood that if a Canadian canal vessel has to pass every week through a hundred or more locks, and if the time lost in locking can vary from 70 hours per week for an unsuitable type to 30 for a well-designed and well-handled canaller, it may be well to design rather to overcome the lock and canal delay than from mere considerations of the best speed obtainable in open water, especially as the time which many of these vessels spend in open water is very short.

It has been found, for example, that by the use of a very broad-bladed propeller, with a pitch ratio of 1·1, and at about 80 revolutions per minute, the best results can be obtained in locking operations. The propeller is so designed that it has great driving power ahead and astern in locking operations, quickly decelerating and accelerating the speed in manœuvring into or out of a lock as the case may be. A type of Lake propeller is shown on Fig. 2. If one, in imagination, place the vessel shown on Fig. 3 in one of the locks, which it absolutely fills, one will the more easily realize the general helplessness for efficient results of any small fine-pitched high-speed propeller, however excellent that type be in open water work. Furthermore, in lining up to enter a lock, the broad-bladed Canadian propeller can be utilised to throw over the stern of the vessel without occasioning headway, by giving the big, coarse screw a short full-speed impulse with the rudder hard over. This is done as a last resort in entering a lock to prevent a foul entrance, the occurrence of which generally results in a heavy blow on the one bow, a rebound with a blow on the other bow, and finally a severe nip abreast of No. 1 or No. 2 hatch, with the inevitable consequence of serious structural straining, leaky rivets and damaged cargo.

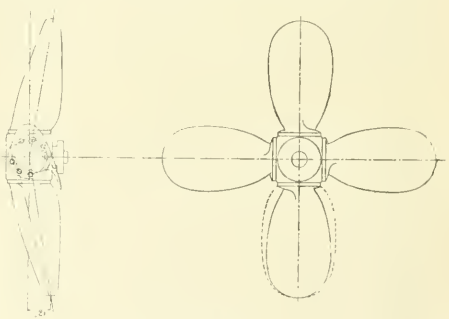


Fig. 2.

Particulars:—Diameter of Propeller, 12 feet. Pitch of Propeller, 13 feet.

Surface:—Projected, 45 square feet. Developed, 55 square feet.

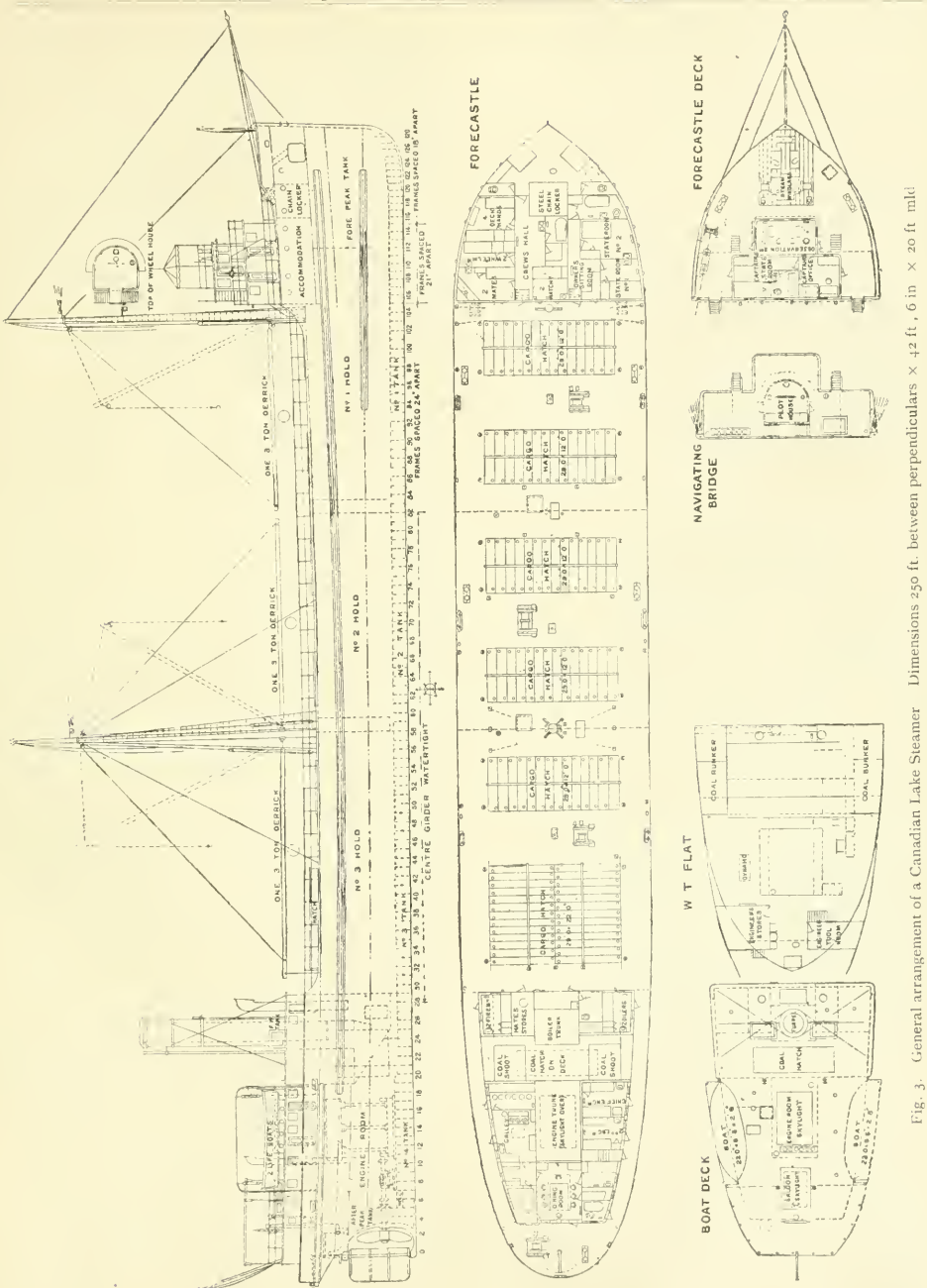
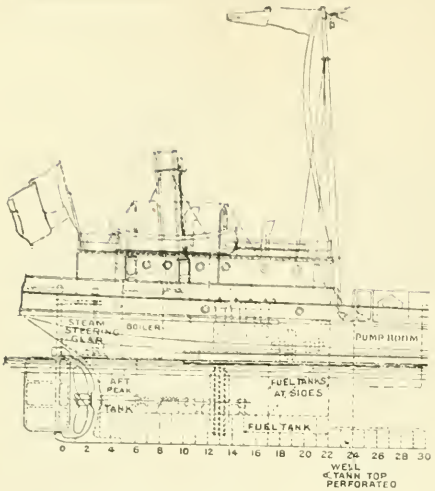


Fig. 3. General arrangement of a Canadian Lake Steamer Dimensions 250 ft. between perpendiculars × 42 ft., 6 in × 20 ft mld


STEAM STEERING GEAR
BOILER
PUMP ROOM
AFT PEAK TANK
FUEL TANKS AT SIDES
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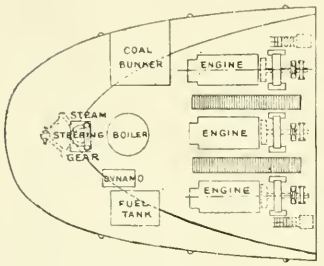
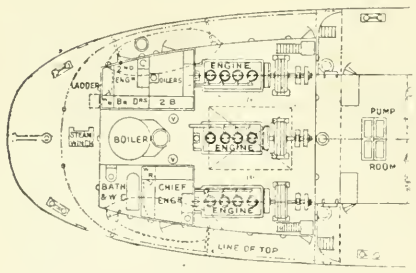
WELL & TANK TOP PERFORATED



LOWER DECK



POOP DECK

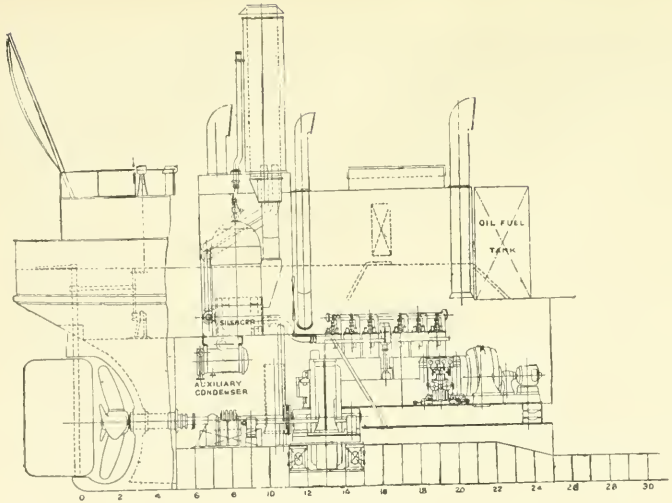
Fig 4.

Design for Lake vessel with Diesel engines and Electric transmission.

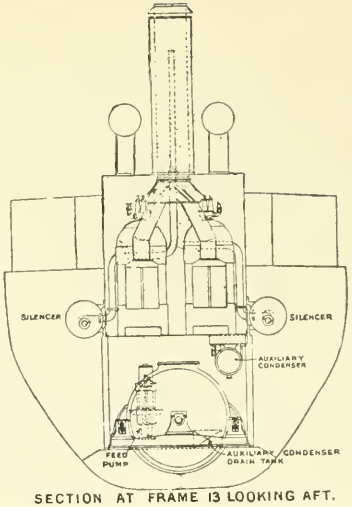
When the design of the hull, Fig. 3, is carefully considered, it is found that other circumstances, for the most part also arising from local considerations, militate against any advantage being taken of the fact that these vessels trade in comparatively sheltered waters to reduce the scantling in an effort to add to the deadweight. The main scantlings, framing and plating must be fully up to deep-sea requirements, apart altogether from the fact that these vessels, being largely built in the United Kingdom, have to make passage to Montreal, generally in a two-thirds full load condition, over the stormiest region of the Atlantic. It is essential, in fact, to have even stronger close spaced framing forward, almost as if providing against ice to enable the vessel to resist the continual pounding against the lock walls and approaches, to which it is inevitably subjected in this canal trade. The double bottom must be deep, so as to provide ample water ballast to get the vessel well immersed in ballast trim, otherwise canalling and locking become impossible in a high wind, a great cause of lost time for badly designed vessels. The bottom plating must not be less than $\frac{1}{2}$ in. to resist occasional rubbing in the canal; the tank top plating must be equally heavy to withstand blows from the unloading grabs; the bilges require 23-40 for protection against canal bank rubbing, and the decks must be heavily plated and well supported for deck cargoes of pulp wood and lumber, which may be stacked as high as 14, 16 and even 20 ft. above the deck. Under these conditions, if an attempt is to be made to increase the deadweight carried on the canal draught of 14 ft. and owners are perpetually urging such increase—it is found that a limit is soon reached beyond which no reduction in weight of scantlings is possible, and as the form is usually ·83 block or fuller, the deadweight capacity cannot be materially increased by any changes in hull form or structure. In a word, the designer is bound hand and foot as to dimensions, form and hull weights, and is, therefore, driven to reconsider his propelling machinery in an effort to economise in the weights of machinery and fuel. It is this fact that makes this class of vessel a most natural type in which to experiment with the internal combustion marine engine of the Diesel or other type. First efforts, however, were devoted to adapting the gas engine and producer, because, while fuel oil is very plentiful and cheap on the Lakes, coal of all kinds, including anthracite, is even more widely available, and at very reasonable rates. Therefore it was natural to consider the producer-gas proposition in the first place.

In 1908-1909, the marine gas-engine had not been reduced to any very practical or reliable form, and the land engines built and running offered very little in the way of experience to guide one in adapting them to marine work. Reliability was doubtful, reverse uncertain, revolutions much too high, and reduction gear at that time by no means to be relied upon. Finally, the attempt to adapt the gas engine was reluctantly abandoned and the experience of other investigators in this field goes to show that this was an escape from an adventure full of trouble. One thing, however, the writer's investigations did indicate, and that was that no internal combustion engine then extant could be coupled direct to a Lake type of propeller, and that to substitute a suitable type of propeller for the proposed engine, regardless of local requirements in Canadian waters, was to court certain failure under the conditions indicated above. Mechanical reducing gears, though considered, did not offer any great prospect of success, because the reversing gear on the main engines had to be retained, which certainly promised another source of weakness and loss in canalling, possibly a failure to start or to stop under conditions as regards locks and gates certain to result sooner or later in serious disaster. At this time electricity seemed to offer possibly the best prospect of successful solution to this problem. Being satisfied that the single Lake type of propeller and the facilities for manœuvring the same under steam would have to be retained if failure was to be avoided, it remained to find some third feature through which the desired large slow-turning propeller could be reconciled with the comparatively light high-speed internal combustion engine of the Diesel or other type. It must be admitted that the introduction of electricity for this purpose, while committing one to a certain loss in transmission, gave assurance of certain incidental advantages of great value, which had not originally been anticipated.

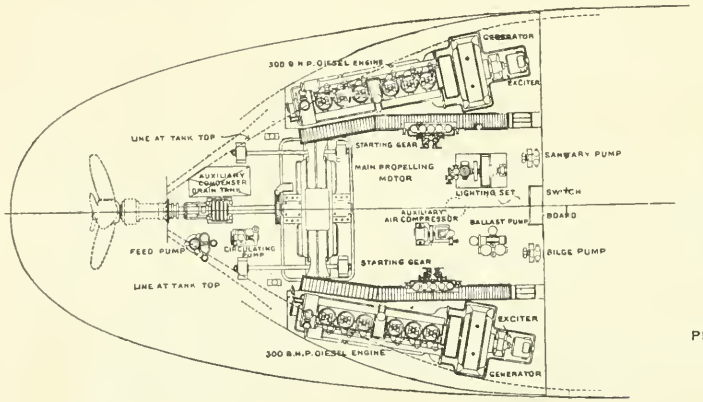
No internal combustion engine, Diesel or other, known to the writers, is an absolute substitute so far as simplicity of operation and reliability of handling are concerned for the ordinary up-to-date triple-expansion steam engine, even in deep-sea go-ahead work, much less in manœuvring in narrow waters within harbour limits or in rivers or canals. Whatever success may have been obtained by the recently developed two-cycle, slow-speed marine type of Diesel engine, and there is here no suggestion that success has been other than most encouraging, it still seems that the line of development



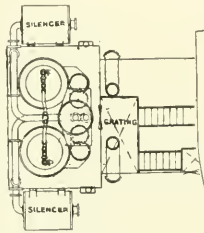
SECTIONAL ELEVATION



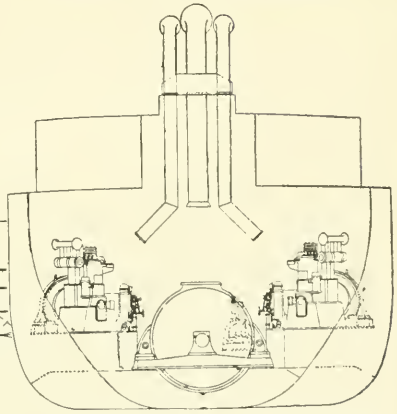
SECTION AT FRAME 13 LOOKING AFT.



PLAN.



PLAN OF BOILERS.



SECTION AT FRAME 13 LOOKING FORWARD.

Fig. 5.—Arrangement of Machinery for an Electrically Propelled Vessel (Mavor system) for service on the Canadian Lakes and Canals.

followed is not such as seems likely to lead to the evolution of a propelling engine which an owner will be as ready to have in his vessel as he would an ordinary steam outfit. Attention has been paid to obtaining a specious resemblance to the marine steam engine in an effort to make the Diesel engine exactly suited to take the steam engine's place direct on the propeller shaft for the sake of a simplicity which is more apparent than real. To get the low revolutions most desirable for propulsion in slow-speed cargo vessels important advantages in the normal Diesel engine, such as high speed, low weight and moderate over all dimensions, have been sacrificed, while the necessity for fitting reversing gear on the engine itself has added a most unfortunate complication, necessitating the lavish use of compressed air in manœuvring, an addition of a particularly troublesome and expensive nature. Furthermore, experience has already shown that the use of large single-screw Diesel engines in propulsion is attended with grave risk of the breakdown of the whole propelling mechanism of the vessel.

It is idle to deny that there is inherent in the very operating principle of the Diesel engine an element of delicacy and unreliability very little in keeping with the rough work of marine propulsion, from which the modern steam engine emerges with credit. The fuel economy which has been the one real outstanding claim for the adoption of the Diesel engine is, in fact, dependent on an operation of great nicety, involving the use and maintenance of very delicate mechanism. A governor action controlling this mechanism is set in motion by the racing of the engine in a seaway, and the cycle of the cylinder operations, so far from continuing uniform, as is essential for good working, are periodically interfered with, probably under impulses given too early or too late, with inevitable trouble. It must be considered also that no engine of the Diesel type, with its numerous spring-loaded cam-driven valves and other fine-set gear, can take kindly to the vibration set up by the action of a vessel in a seaway. The reference here is particularly to a vessel engined astern, but the same is true of any position of the machinery in direct drive. Finally, any adjustments necessary on the Diesel engine, need for which may not be at once apparent, in fact, which may not become apparent at all until serious trouble has developed, must be at once attended to, to avoid trouble, whereas in a steam engine they may without serious detriment be put off to a suitable opportunity.

Enough has been said to indicate some of the points which experience has already developed as requiring consideration in the present Diesel type of marine engines before its reliability can be confidently placed in the same category with that of the triple-expansion steam engine. After all it is the average shipowner's wish to have a ship which, while attaining all reasonable efficiency and economy in its operations, shall be, first and foremost, trustworthy, and the propulsion of which will be carried on as surely as the limitations of the best engineering mechanism will permit. It is hopeless to introduce new methods of marine propulsion which do not guarantee all the security and certainty of the mechanism which they displace. Therefore, it is suggested that it is unfortunate that so much effort has been devoted to attempting to force the Diesel engine into conditions of service for which it appears inherently unfit, without saying that in certain classes of vessels where the conditions are special there may not be a perfectly legitimate field for the type criticised, viz., the direct-drive, slow-speed, two-cycle open marine engine. Such scope is most assuredly not found in the full-bodied cargo boat, still less in the Canadian canal vessel under the peculiar conditions and limitations above described. It is unthinkable that, with its present form of hull, which cannot be varied, and the still more definitely fixed type of propeller, the present triple-expansion engine can be displaced by any direct-connected Diesel engine. Eighty revolutions per minute, which is common with the steam engine, is almost hopeless for the Diesel, and however successfully the reversing gear may operate in the latter engine it is little likely to be improved by hundreds of rapidly alternating go-ahead and go-astern motions required in negotiating such a series of locks as in the Welland Canal.

Broadly speaking, the introduction of electricity in this connection puts the Diesel engine back into work for which it is eminently suited, under conditions which give it every chance to maintain efficiency and reliability. It is as far as possible removed from the uncertain action of the propeller, and the uneven loading and vibration incidental to a direct propeller drive. In Canadian canal work the power required for propulsion varies between very wide limits. In the canals themselves, four miles being the limiting speed, 150 I.H.P. or less is sufficient, though full speed must be always available for emergency, especially in backing. In the open Lake in fair weather 500 I.H.P. is sufficient to maintain fair speed, while 750 I.H.P. is necessary in contending with the St. Lawrence currents. In some designs the writers, therefore, proposed three Diesel generating units of 250 I.H.P., each of which can be switched on to the propelling motor as required. Such an arrangement is shown in Fig. 4. In the *Tynemount*, launched March 26th, 1913, to demonstrate the Diesel electric arrangement of propelling machinery, a two-unit subdivision is arranged for, each unit furnishing 300 B.H.P. Fig 5 shows approximately the general lay-out of the installation, and attention is directed in this illustration, and also in Fig. 4, to the ease with which the generating units can be located in any desired position, in a separate engine-room remote from the propeller motor, or on an upper flat, or as may be considered convenient.

The electric system adopted is that identified with the name of the second writer, involving the use of alternating current. Investigation and actual tests have amply shown the suitability of this system for marine propulsion. This system has for its special object the simplification of the electric equipment. Many applications of electric power have been made to marine propulsion, but hitherto, with the exception of the *Electric Arc*, propelled on this system and built in 1911, continuous currents only have been used, the reason being that regulation of speed and control is easier for continuous current under ordinary conditions than for alternating current. The disadvantages attached to the use of alternating current in respect of regulation are associated with the greater number of conductors and particularly with the property of alternating current motors, that the speed of the motor bears a fixed ratio to the speed of the generator, and that any departure from this speed is associated normally with loss of efficiency and with more or less complicated devices for changing the frequency of the current alternations.

In the system under notice these difficulties are overcome by the use of more than one frequency applied to each individual motor. The currents of different frequency are carried in independent mutually non-inductive circuits, the magnetic systems being entirely independent, but, operating upon a common rotor, so that their mechanical effects can be superposed and the power transmitted in the separate circuits combined to produce the required mechanical effect. The required currents may be obtained from one or more generators.

In the vessel now under description (the *Tynemount*) the equipment consists of two three-phase generators driven by Diesel engines running at 400 revolutions per minute. The electrical output from each set is 235 kilovolt amps. at 500 volts alternating. The generators have six and eight poles respectively, giving frequencies of 20 and 26·6 per second. The exciting current is obtained from direct connected continuous current machines on the same shafts as the alternators. The normal exciting current is 30 amps. at 100 volts. A single three-phase motor is coupled direct to the propeller shaft, which is of the ordinary type with marine thrust block. The motor develops 500 S.H.P. The rotor or moving part is of the simple squirrel cage type, without any electrical or mechanical connection other than its rigid attachment to the propeller shaft. The stationary part of the motor has two separate non-inductive windings for 30 and 40 poles respectively. When each of these two windings is connected to the appropriate generator, the speed due to each is 78 revolutions per minute. By changing the connection on both windings, the direction of rotation is reversed, and by connecting the 40-pole winding of the motor to the 6-pole generator the speed in either direction drops to 58 revolutions per minute, or about three-quarters of the full revolutions. If full speed be not required, one generator may be stopped and the other left running at full revolutions under governor control and at full economy, because the power required to drive the ship at three-quarters speed is about half of that required to drive it at full speed. If either of the generators be left attached to its own winding and the other generator shut down, the ship is propelled by either engine at a little over half speed, the speed of the ship

falling with the speed of rotation of the engine, until an automatic adjustment of power and speed is reached at about half-speed.

The control gear consists of an apparatus for changing the connections of the generator and motor windings respectively. There are five positions on the switch, corresponding to the ordinary positions on the engine-room telegraph. They are "Full Speed Ahead," "Half Speed Ahead," "Stop," "Half Speed Astern" and "Full Speed Astern." Each position of the controller is definitely fixed by means of cams and rollers, so that stopping at intermediate positions is prevented. The controlling gear provides for the interruption of the excitation of the generators while the switch is being moved from one step to another, the exciting switch and the main switch being interlocked so that the switching over operation is accomplished while the electric circuits are "dead," thus avoiding injurious sparking. Should it be found convenient, a very simple arrangement could be made whereby the control could be operated from the bridge of the vessel, and the engineer's attention confined to the keeping of his engines lubricated and supplied with fuel to run at constant speed.

It will be seen that this method of control entirely dispenses with the stopping and starting of the Diesel engines for manœuvring, an operation, which, in itself somewhat difficult, becomes impossible if a liberal supply of compressed air be not available. To keep up a supply of compressed air for manœuvring the vessels in the locks and channels of a canal involves the upkeep of a very expensive and inefficient air-compressing plant, and the dispensing with this auxiliary is a very important feature of the system. It is also advantageous to have two units, each capable of driving the ship, so that in the event of any interruption to the running of either the vessel is still under control.

The functions performed by the electric equipment may be recapitulated:—(1) It adapts the speed of the engine to the speed of the propeller. (2) It combines the power of separate engines and applies the whole to a single propeller, with perfect freedom to use either or both power units. (3) It provides a simple and easy reversal of the propeller, while leaving the engines running in one direction at constant speed. (4) It also provides ready means of distant control should this be required. It will be seen that the use of mechanical gearing could perform the first and the first only of these functions, and for this reason it is anticipated that, compared with a mechanically-geared or direct-connected Diesel engine equipment, the electrical equipment will offer very material advantage in the operation of the vessel in the special circumstances under which it is placed.

The writers have endeavoured to show how important, and, indeed, even indispensable for reliability and efficiency, the use of electric transmission may be in the propulsion of so relatively simple a type as this Canadian barge where it is decided to adopt the Diesel engine. This should help to dispose of the too prevalent idea that the natural scope for electrical propulsion is in warships or other highly specialized vessels, in which electricity might provide means for adjusting economically the power generated to the very conflicting power requirements, say, under peace and war conditions. Undoubtedly a battleship or battle cruiser does offer the very best scope for the electric drive, but only because that class of vessel presents on a large scale the same problems in propulsion which are found in almost all other vessels, viz., how to adjust efficiently and economically the power available to the power required at any given time, not necessarily always from the point of view of propulsion alone.

From the analysis of the voyage logs of an ordinary tramp steamer, the second writer has shown (see *Electrician*, June 10th, 1910) how important towards efficiency of propulsion might be the introduction of electric transmission, with the added economy of a modern high-speed reaction turbine as the power generator, in place of the usual triple-expansion

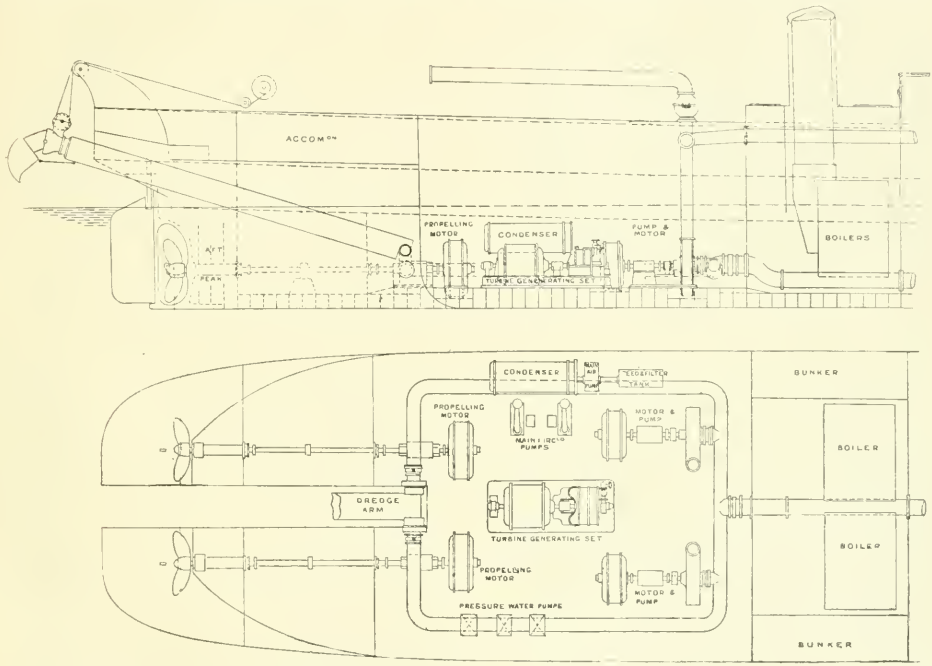


Fig. 6.—Design for Dredger with Electric propulsion.

engine and oil engine, in this case such possibilities of economy are confirmed by the results since obtained with mechanical gearing introduced for the same purpose. An advantage of the vessel lies with the electrical arrangement in that it permits a much wider range and variation of revolutions between the propeller and the turbine, permitting also a more advantageous subdivision of the generating plant into units of different sizes, and finally eliminating the necessity for reverse in the turbine and simplifying the control.

In the United States Mr. Emmett, of the General Electric Company, has also shown the suitability of electric propulsion for a deep-sea collier of great size and 7,000 H.P., for which the equipment has already been completed and tested with the most brilliant results. From such a vessel to a large passenger liner such as the *Celtic* is a mere step, and in such vessels also the possibilities of economy and all-round efficiency are most marked.

In such matters it is much too common to pronounce judgment for or against without adequate analysis of the problems, which are as numerous and varied as the vessels which come up for consideration. In this connection, trial-trip data, however valuable for comparative purposes, cannot be used as a guide, because what we are concerned with is maximum efficiency in working conditions; not propelling efficiency alone, but the innumerable phases of the working of a ship of which propulsion is, perhaps, the most important, all of which have a bearing on the general efficiency of its operation. Experience in developing a comparatively simple type, such as this Canadian canal vessel, shows that it is frequently quite impossible to convey to the builder any adequate conception of how such a vessel is handled, and has to be handled, to get maximum efficiency out of it in the short six months' season. What Lord Kelvin used to call the "bias of preconceived notions" is apt to prevent a detached view on the part of the builder, especially when a decided departure from established practice and precedent is called for. For example, the idea that special scantling provisions forward should be fitted to any type of vessel to enable it to "butt" stone walls and quays with impunity seems to many builders very unreasonable, though the same builders might not hesitate to fit special bow stiffening against ice.

It is for this same reason that one is not surprised to meet with considerable scepticism in regard to the scope for electricity in marine propulsion. To the majority of sea-going engineers the idea of a transmission feature between the driving engine and the propeller is simply anathema. To prevent such an introduction an infinity of pains will be devoted to experimenting with high-speed propellers and low-speed turbines and oil engines with an all-round lowering of total efficiency and an increase in complication actually in excess of that which it is desired to avoid. There are not 10 per cent. of the merchant vessels now afloat which would not be most efficiently propelled by screws designed to turn at revolutions not exceeding 80 per minute, and for real progress towards maximum efficiency in marine propulsion one should at all costs retain the simplest form of propeller, the efficiency of which permits of no dispute, and from that basis arrive through the various methods of transmission now available at an arrangement of machinery best suited to each individual case. At the start such a scheme of powering a vessel would work a hardship on the builders of standard marine machinery; but it should be understood that, in advocating the use of transmission gearing, one does so to enable the newer forms of power generators to be utilised.

Nothing is more likely to retard the introduction of the internal combustion engine in marine work than the mistaken attempt to treat it as a perfect substitute for the triple-expansion engine which it is intended to displace. It is at this point that electricity acts as a safeguard in a way that no other system of transmission can approach.

There are, of course, problems of propulsion, the analysis of which shows that approximately equal results may be obtained whichever form of transmission gearing, electric, hydraulic, or mechanical, is adopted. In such cases the decision will no doubt lie with that system which offers the greatest reliability and simplicity of operation. The success which has attended the introduction of the geared turbine and the hydraulic transformer is of good augury for similar success with electric transmission. But there is a class of problem in marine propulsion for which the only possible solution is through electrical means, viz., vessels in which propulsion is only one, and sometimes not the most important one, among many functions calling for power, which it is evident would be most efficiently provided from a central generating station. Among such vessels one might class the larger sizes of warships, with their multitudinous requirements in power for the driving of auxiliary engines as well as propelling machinery, but for purposes of illustration it is probably better to take a simpler case, such as a dredger, say, of the self-propelled suction type. Attention was first called to the suitability of electric drive for such vessels by Professor Biles and Mr. H. A. Mavor, and Mr. John Reid has recently completed a design for a large vessel of this class, which clearly indicates the very important advantages which may be obtained by the introduction of a central generating station, furnishing power as required to the propellers, the dredge pumps or the numerous auxiliary machines.

Fig. 6 shows the general lay-out of the engine-room in which there is a single generating turbine plant with electric motors on the screw shafts and also on the dredge pumps. In a similar steam-driven job there are four separate triple-expansion engines, two for propulsion, each of 800 I.H.P., and two for the pumps, each of 500 I.H.P., or a total of 2,600 I.H.P. When it is considered that the introduction of the electric system allows the total horse-power generated to fall back to 2,000 as a maximum, without in any way prejudicing the operations of the dredger, it is at once apparent that here we have a first-class incentive to adopt an electric arrangement. A further incentive of great importance in such work is the ability which the use of electricity confers to place the complete control of the dredger in the hands of one man, the dredger master. Here, again, we have evidence of the importance of studying such a problem rather from the side of the dredger operator than from that of the dredger builder. No real progress can be made until this is done. By a simple system of switches, scarcely more complicated than ordinary bridge telegraphs, one man can handle the whole machine directly with the very greatest advantage to the efficiency of the dredging operations.

Such are some of the most likely cases in which electricity seems to offer a means of solving certain difficulties in the power question, which are, after all, only components of a problem which in one form or another has long confronted the marine engineer, viz., how to generate the power required in a given vessel independently of the means used for propulsion, enabling the source of power for all purposes to be concentrated in a central station with a simple, economical and easily-controlled system of distribution, by which the power generated for any particular purpose may be exactly related to its requirements.

North-east Coast Institution of Engineers and Shipbuilders.—The summer meeting of the North-east Coast Institution of Engineers and Shipbuilders was held in Holland and covered the period, the 23rd to the 27th of June. A very complete and well-arranged "Programme of proceedings" was issued by the Institution, detailing the various events and giving other useful information for the benefit of the members. Amsterdam, The Hague and Rotterdam and other places were visited, and while in Amsterdam some of the members went over the Shipping Exhibition. Several shipbuilding and engineering firms in Amsterdam and Rotterdam kindly threw open their establishments for inspection by the members of the Institution.

Messrs. Jas. Walker & Co., Ltd. It is necessary to keep moving on towards perfection, and in order to show to customers the progress being made from time to time, catalogues are produced and reproduced when additions and improvements are made to meet the growing exactions. Messrs. Walker's latest catalogue is brought up-to-date and treats of all the many varieties of packings manufactured by the firm for steam, water or chemicals; hoses for water, steam or air; asbestos goods, joints, non-conducting materials; pipe-lapping, mattresses for the bottoms of boilers; packing rings, cones for gauge glasses; belting; I.R. valves for pumps; metal valves; fibre jointing; asbestos tapes; putty and all the other articles of manufacture comprised under india-rubber and asbestos.

equal high-pressure and low-pressure turbines, the low pressure being again arranged on the outer shafts. The bladed part of a low-pressure rotor has a diameter of 11 ft. 10 ins. and a length of 17 ft. The diameter of the cylinder is 17 ft. 6 in., length 25 ft. Each low-pressure turbine weighs about 380 tons and is capable of developing about 17,000 effective h.p. The rotor of a low-pressure turbine is fitted with 50,000 blades. The total turbine installation has 760,000 bronze blades. The thrust bearings, which have to take up the thrust of the propellers, have a surface of about 75 sq. ft. altogether. The exhaust steam is condensed in four condensers of pear-shaped section, each having a cooling surface of 16,150 sq. ft. Four centrifugal pumps of 4 ft. 3 in. diameter, driven by two engines, supply the cooling water for the condensers. Four double-feed pumps draw the feed water from the tanks in the double bottom, and, in conjunction with four main-feed pumps, deliver it into the boilers.

WATER-TUBE BOILERS, ETC.—There are forty-six single water-tube boilers arranged in four rooms, each 75 ft. long and extending with their bunkers over the whole width of the ship. The necessary steam is generated at a pressure of 235 lbs. on the inch. The total heating surface is 203,000 sq. ft., and the total grate area 3,760 sq. ft. The air required for the forced draught is drawn by four fan blowers. Each of these blowers has a fan of 13 ft. 9½ in. diameter and forces the air through channels of 45 sq. ft. cross-section into the space under the grating of the furnaces. Four ash-ejector pumps with 6,356 cubic ft. capacity per hour, sixteen ash ejectors, six ash hoists, and three ash-cooling valves are provided for removing the ashes from the furnaces over-board. Four steam bilge pumps, each of 4,944 cubic ft. capacity per hour, continuously empty the bilges of the engine and boiler-rooms. Four feed-water purifiers, two oil separators, as well as two mixing feed-water heaters and two economisers for heating the feed water, are provided.

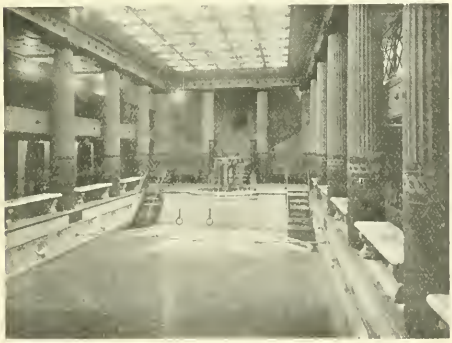
STOKEHOLDS.—There are four stokeholds, each of which is 75 ft. long and with its coal bunkers extends over the entire breadth of the vessel. The bunkers can hold more than 8,500 tons of coal.

ELECTRIC LIGHTING SYSTEM.—An efficient electric lighting system contributes to comfort and safety. Current is generated by five turbo dynamos of 2,000 ampères and 110 volts, which serves to give power to 10,000 electric lamps on the ship. A sixth dynamo of 100 ampères is placed far above the water line, ensuring light, even if the machines in the lower engine-room are disabled.

WORKSHOP.—A completely fitted machine shop is situated in the forward engine-room, containing all the latest and most powerful machines, including lathes and drills, planers, etc.

ANTI-ROLLING TANKS.—Frahm's anti-rolling tanks have been fitted and thus the rolling of the vessel is reduced to a minimum, so that passengers are assured of pleasant conditions at all times.

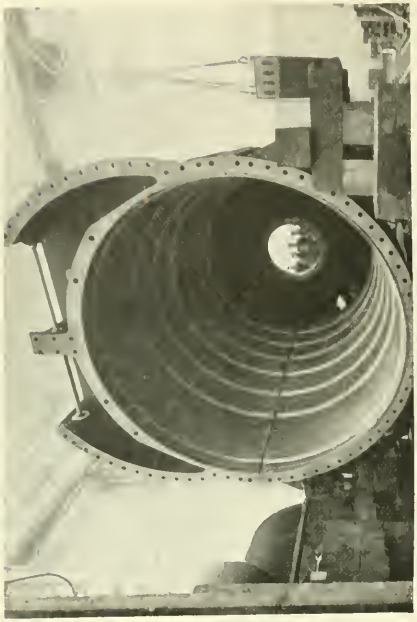
THE ANCHORS consist of one best bow anchor weighing 12 tons, and two second bow anchors of 8 tons each; one



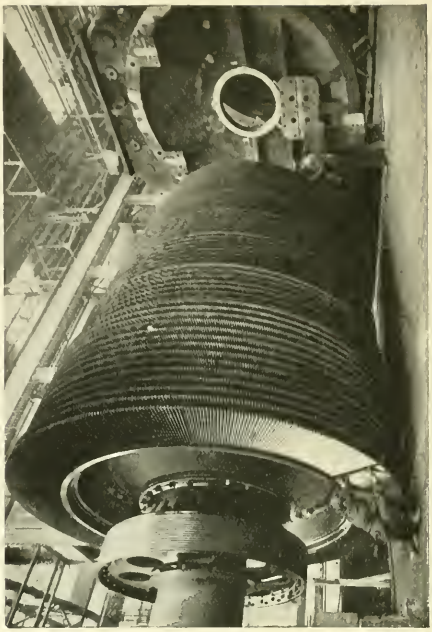
Swimming Hall.

View of Inner Skin.

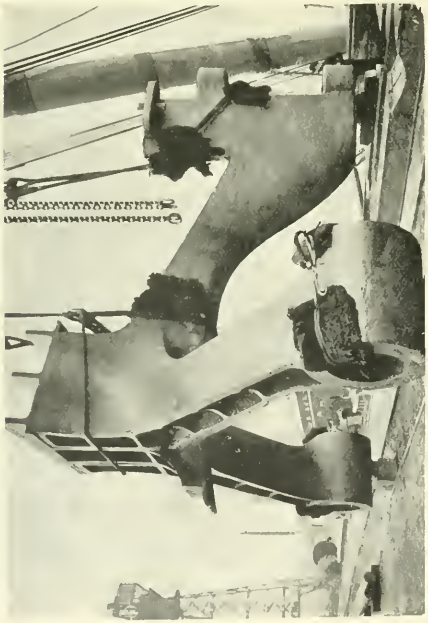
The Winter Garden



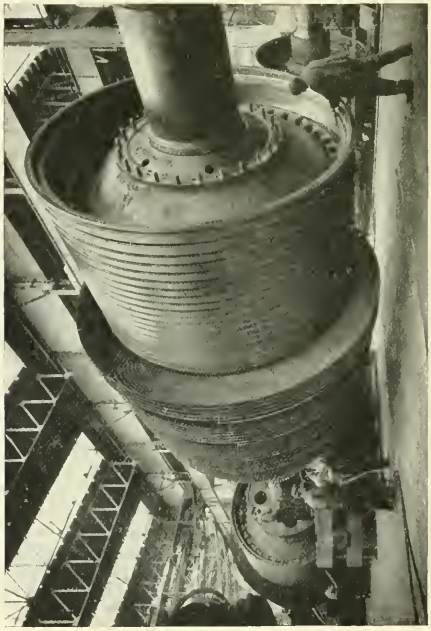
Turbine Casing.



Turbine Drum



Stern Post.



The Grand Staircase.

View of the Ritz-Carlton Restaurant from the Winter Garden.

stream anchor 5 tons 4 cwt.; one kedge anchor 2 tons 5 cwt. The cables have a total length of 632 fathoms; diameter of links $2\frac{1}{8}$ in., $3\frac{1}{16}$ in., and $4\frac{1}{16}$ in. Total weight of anchors and cables, 220 tons.

THE RUDDER, weighing 90 tons, turns on the rudder-post in five gigantic pintles. Diameter of rudder shaft is about 2 ft. 6 in. The rudder-post is of cast steel, and is built of two pieces. It is 57 ft. 5 in. high and weighs 110 tons.

WINCHES AND CRANES.—The winches and cranes on board are ten cargo winches of 3-tons lifting capacity each; three warping winches on forecastle head and poop; electric cranes (two forward, two aft) for handling luggage, mails and provisions; four electric boat winches.

THE RIGGING consists of two steel schooner masts; foremast fitted with two crow's nests, of which one is intended for use in normal weather, while the other is elevated 135 ft. above the forecastle head, where a safe look-out may be kept in a head sea.

DECK OFFICERS.—Careful attention has been given to the navigating department. There is Commander Ruser, the commodore of the Hamburg-America fleet in supreme charge, one acting and three reserve captains, one whose special duty is the navigation, and seven officers, all with masters' certificates.

ENGINE-ROOM STAFF.—In the engine-room there are the chief engineer, three first engineers and twenty-five engineer officers, besides greasers, stokers, trimmers, etc., numbering about 350.

SHIP'S COMPANY.—The total ship's company numbers 1,180

PASSENGER ACCOMMODATION.

FIRST-CLASS.—The first-class and main dining-room is 98 ft. wide and 25 ft. high; it has accommodation for, including the gallery which runs round it, 700 passengers and is fitted with small tables for from two to eight persons. The Ritz-Carlton restaurant, under the management of the Ritz-Carlton Hotel, London, adjoins the winter garden here. The grill-room, which is situated at the end of the promenade deck, has large windows on three sides, and is artistically furnished with gold brown oak furniture, such as was produced in West Schleswig and the northern parts of Friesland about 1700. For the first time a Tudor room has been placed on a liner; and has been done at the suggestion of the Crown Prince, whose idea it was that the *Imperator's* smoking-room should be furnished and decorated in the Tudor period. It has a large open fireplace, the red brickwork over which (as well as that in other parts of the room) realistically reproduces that of the sixteenth century. The bricks in question came from a Buckinghamshire cottage of the Tudor period, which was demolished for the purpose.

The staircases, passage ways, decks and saloons are remarkable for their spaciousness. The entrance hall is 98 ft. wide and 69 ft. long. The three main staircases in the first saloon are 57 ft. high. On the various entrance halls are situated the offices of the chief steward, purser, baggage master, doctors' consulting and waiting-room, chemist's shop, bookstore and florist shop. Passenger elevators convey passengers from the second deck to the boat deck, running through five floors. The palm garden, which, including the skylight, is 18 ft. high, adjoins the Ritz-Carlton Restaurant.

Ball Room.

Smoking Room, showing Fireplace.

The ball-room is undoubtedly one of the greatest innovations on the ship. It is 72 ft. long, 58 ft. wide and 18 ft. high; the floor is of parquet which, when not being used for dancing is covered with a carpet; the walls are decorated with costly old Gobelins tapestry and have bow windows 10 ft. high on either side. It has been constructed without any pillars visibly supporting it. Another unique feature on the ship is the two complete self contained flats which call for special notice on account of the unusual size of the rooms and the rich artistic decoration. These are situated on the lower promenade deck and comprise drawing-room and verandah with large windows opening out over the sea, dining-room, two bed-rooms, two bath-rooms, dressing-room, box-room, and pantry.

The great size of the *Imperator* has enabled her designers to allow unusual space for passenger accommodation. Formerly, berths were placed one above the other; these have been entirely eliminated in the first-class accommodation of the *Imperator*, bedsteads of ample proportions being used in their places. The total elimination in the first-class of the folding washstand, formerly regarded as indispensable on board ship, is noticeable; in its place is a commodious marble washstand with running hot and cold water. All rooms are provided with steam heating system, electric heaters, electric light, etc. A complete artificial ventilating system provides excellent air circulation in each room. The cabins are of unusual size and extend over five decks, from the promenade deck to the second deck amidships. The cabins, with very few exceptions, are all outside rooms, that is to say, having direct light and air. The generous proportions of the state-rooms allow for the construction of large wardrobes, better toilet facilities, and an increase of the size of tables, chairs and sofas; there are 150 cabins with private bath rooms and over 200 cabins for the sole use of one person.

The Roman bath of the *Imperator*, with its decorative Pompeian pillars and ornamental cascades of running water, is a masterpiece. The swimming pool has been built after the designs of the ancient Romans. The total length of the Roman bath is 65 ft. and the width 41 ft. The greatest depth of water will be 7 ft. Eighteen decorative Pompeiian pillars support the deck with its sunken clusters of lights, and also a gallery for visitors. The various dressing rooms are fitted with marble and bronze railings; plaques and marble seats lend an air of luxurious refinement. The sea water in the pool will be constantly renewed through the decorative cascades. Adjacent to the pool are comfortable rest rooms with spacious sofa couches and wall decorations in the Pompeiian style. Electric, Turkish and steam baths, massage apparatus and hair-dressing saloons with the most modern equipments are also provided.

For the physical recreation and amusement of passengers the *Imperator* leaves nothing to be desired. First cabin passengers have two large covered promenade decks and one open promenade on the boat deck. The upper promenade deck is enclosed in the front and along two-thirds of the length of each side by heavy plate-glass windows to shelter the passengers from the high winds. This deck is 10 ft. high and varies in width from 16 to 23 ft. The passengers will readily appreciate the ample space provided for promenading and idling in deck chairs. The boat deck space available for promenading is naturally restricted by the placing of sufficient lifeboats to accommodate all on board, excepting during pleasant weather, when the boats may be swung outward, thus leaving more space available for promenading.

The gymnasium on the *Imperator* in the first-class is the largest and most luxurious that has ever been fitted up on a passenger steamer, and contains everything to satisfy the sportsman's most exacting requirements.

THE SECOND-CLASS.—The second-class accommodation, although not quite so luxurious as that of the first-class, is in advance of anything that has been provided for this ever-increasing class of travel. All the public rooms are large and furnished and fitted in a manner that leaves nothing to be desired. There is a large dining saloon, reading and writing-rooms, music saloon, smoking-room, and for the first time on any ship, there has been installed for the use of second-class passengers a gymnasium, replete with every possible apparatus. A passenger elevator has also been provided in this class and here again the installation is unique. The cabins are for two, three and four persons and are situated

Grill Room.

over four decks, and contain everything necessary for the comfort and convenience of travellers.

THE THIRD-CLASS.—Here again passengers are catered for in a manner quite out of the ordinary. They are provided with spacious dining-room and reading-room which contains a piano, and are berthed in cabins for two, three, four and six persons. These cabins are all painted in white and are very spacious.

THE STEERAGE.—In this class, passengers are berthed in cabins for two, four or eight persons, and have a spacious dining-room, reading-room, etc.

HOSPITAL AND STAFF.—The vessel carries three doctors and two assistant doctors, trained nurses, masseur, masseuses, and attendants for the medical baths. The hospital contains sixty-two beds. The operating theatre is replete with every modern requirement.

TOTAL PERSONS ACCOMMODATED.—The total number of persons on board the ship when full is 5,200, made up as follows:—First-class, 720; second-class, 600; third-class, 900; steerage, 1,800; crew, 1,180.

PROVISIONS.—Some idea may be gathered of the quantity of food required to feed this "Town" from the following particulars. For each outward or homeward trip across the Atlantic, among other things too numerous to mention, are the following fresh provisions:—45,000 lbs. fresh meat; 8,500 lbs. game, poultry; 8,000 lbs. fish, 48,000 eggs, 35,000 lbs. vegetables, 12,000 lbs. fruit.

Non-perishable provisions for outward and homeward journey:—100,000 lbs. potatoes, 4,000 lbs. rusks, 350 barrels of flour (180 lbs. each), 18,000 lts. vinegar, 60 barrels salt

Ladies' Saloon.

One of the *Imperator's* Anchors, weighing 12 tons.

(150 lbs. each), 500 lbs. mustard, 150 lbs. pepper, 2,000 lbs. groceries, 24,000 lbs. salted meat for steerage and crew, 8,300 lbs. ham, sausages, tongue and bacon, 2,000 boxes and 100 barrels preserved fish, 750 lbs. smoked fish, 5,800 lbs. cheese, 6,500 lts. sterilized milk and cream, 5,000 tins condensed milk, 5,000 lbs. butter, 6,000 tins vegetables, 800 boxes of mushrooms, 2,500 lbs. pickles, 6,500 lbs. dried fruit, 2,000 lbs. jam, 10,000 lbs. sugar, 5,000 lbs. coffee, 500 lbs. tea, 400 lbs. cocoa, 4,000 lbs. rice, sago and oatmeal, 18,000 lbs. rice for crew and steerage.

VENTILATION.—Besides natural ventilation, artificial ventilation is provided for all social and living rooms by means of eighty Sirocco fans of from 1,500 to 3,000 cubic ft. individual capacity per minute. The steerage is ventilated and heated by a thermo-tank installation. There is also an ozone installation. It should be observed that there are no ventilating cowls on this vessel.

It is not alone the size of the *Imperator*, however, that is impressive. Its many unique features are a revelation of the shipbuilder's art. Its accommodation has been arranged on a most superb scale and there is so much wonderful elegance that it is impossible to try to give a correct impression of it. The vessel must be seen in order to appreciate it.

HAMBURG-AMERICA "VATERLAND."

FURTHER particulars of the *Vaterland*, recently launched for the Hamburg-America Line, have been issued. The dimensions are now stated to be: length between p.p. 905½ feet, beam 100 feet, height to main deck 63 feet. The number of decks will be eleven, the main deck being the sixth from the bottom. The highest point of the funnel will be 197 feet above the water line and the masts 249 feet. The launching weight was 32,000 tons. The propelling machinery consists of turbines, to which steam is supplied by water-tube boilers. The four turbines for steaming ahead can either be driven in series or separately, and their contract power exceeds 61,000 effective horse power at 180 revolutions per minute. The astern turbines can also be worked separately. The daily consumption of coal will be about 900 tons. Accommodation will be provided for 750 first-class passengers, 600 second-class, 1050 third-class, and 1900 steerage. The crew comprises 1200 officers and men, including 340 stokers and trimmers. Boat space will be provided in excess of requirements.

MESSRS. BLOHM & VOSS' SHIPYARD IN HAMBURG.

NEW SLIPWAY PLANT AND CRANE.

ON the 3rd April, 1913, the largest ship in the world, the 56,000-ton *Vaterland*, was launched from the yard of Messrs. Blohm & Voss, Hamburg.

For building such gigantic vessels, the slipways already in existence did not suffice, and Messrs. Blohm & Voss therefore ordered from The Deutsche Maschinenfabrik Act. Ges., Duisburg, a new slipway of such a size as to amply meet all requirements for a long time to come. Fig 1. shows the moment when the *Vaterland* was launched, and in the background is the new slipway.

The length of the slipway is about 291 metres (954·72 feet) and its inside width at the end nearest the water is about 85 metres (278·87 feet). It has two launching slips, and is so equipped that two vessels each 25-35 metres (82·02 feet-114·83 feet) wide can be simultaneously built alongside each other. The inside height up to the crane track is about 51 metres (167·33 feet). Only the two front portions or "fields" of the new slipway, of a length of about 73 metres (239 ft. 6 ins.) have at present been built, the six back portions being provided for an extension to be utilized later on. The short portion of the slipway at present built is used for floating dock construction.

The entire width of the slipway of 85 metres (278·87 feet) is divided into eight crane "fields." In each "field" two cranes, each of 7½ tons lifting capacity, work, so that there is a total of sixteen cranes. Besides these, on the lower girths of each of the crane tracks, there are two double-rail travelling trolleys, with driver's cage attached, of five-tons' capacity each, therefore sixteen in all. The whole slipway can therefore have sixteen lifting appliances, one behind the other in one line. The span of the two outside and the two centre "fields" is about 12 metres (39·75 feet) each. The cranes working in these "fields" are standard travelling cranes with ordinary crabs. Their lifting speed is 25 metres (82·02 feet) per minute, and the travelling speed 42 metres (137·8 feet) per minute. Between the large crane "fields" there are four smaller ones, of which two have a span of about 8½ metres (28·89 feet) each and the two others a span of about 5 metres (16·4 feet) each. The cranes fitted here are revolving travelling cranes. The load is lifted at a speed of 25 metres (82·02 feet) and the travelling speed is about 60 metres (196·85 feet) per minute. For a revolution of 360° about 40 seconds are required. It is possible, with these cranes, to transfer loads without special difficulty from one working "field" into the next, and further, with the assistance of all four cranes of the two adjoining "fields," to deal with parts up to a total weight of 30 tons.

The travelling trolleys, running on the lower girths of the travelling crane tracks, have a lifting speed of 28 metres (91·87 feet), and a travelling speed of 70 metres (229·66 feet) per minute. The crane tracks all project about 15 metres (49·21 feet) on the end nearest the water. Above them, *i.e.*, diagonal to same, a transferring crane of 35-tons' capacity, of the goliath type, is built. This crane, which also serves the ad-

Fig. 1.—The Hamburg America Co.'s *Vaterland*, being launched from Messrs. Blohm & Voss' new slipway.

joining old slipway plant, has, in case of necessity, to lift over the travelling cranes from one travelling track to another. It is thus possible, in case of necessity, to congregate a large number of cranes at one place, where they would be of greater service than when on their ordinary working fields. If a crane has to be transferred from one track to the other, then it runs on to the projection, and is here lifted bodily by the transferring crane and conveyed to the desired place.

In addition to the new slipway for building ships' hulls for the modern giant mercantile steamers, Messrs. Blohm & Voss were also compelled to erect a new crane to serve for lifting the internal equipment and fitting out of the vessel after launching. This crane (shown fig. 2), first put in operation in April last, was likewise designed and erected by the Deutsche Maschinenfabrik A.G., Duisburg. It has a capacity of 250 tons, and is, consequently, also on account of its gigantic proportions, the largest crane in the world. The crane is constructed as a derricking hammer crane, and consequently has a hinged load-jib. The working height is thereby increased by 22 metres (72·18 feet). When the jib is horizontal the height is about 44 metres (144·36 feet), and when the jib is entirely raised it is about 66 metres (216·54 feet) above the ground. Thus, this crane will be able to satisfy all demands, even if the deck superstructures of vessels increase still further in size.

The revolving portion is fitted like a bell above the column firmly connected with the foundations, the column taking the form of a blunt pyramid of square section. The entire weight of the revolving portion is taken up by a ball roller bearing fitted on the top of the column. The lower part of the bell is supported by the pressure ring fitted on the column, the two turning gears being fitted on the pressure ring. On the front part of the bell, just underneath the jib, the driver's cabin is fitted, which is equipped with the whole of the actuating apparatus for driving the large crane. The cabin is so arranged that the driver may have an uninterrupted view over the whole working field of the crane and be able to see the load, no matter what position it is in. A searchlight is fitted on the driver's cabin for use when the crane is worked at night.

The jib, which is supported by two strong steel pivots, consists of two parallel carrying walls, between which the travelling track for the large crab is suspended, so that the upper girth connection can run right through for the whole length without interruption. The derricking of the jib is effected by two spindles, each of 460 m/m (18·1 inches) diameter, which run in different directions, and are fitted in the counterweight arm, and work on two rods connecting the jib with the derricking gear. On the extreme end of the back part of the jib a counterweight, consisting of concrete in an iron-plate box, is fitted. Above this box the winding house is arranged, in which practically all the driving mechanism of the large crane is fitted.

On the upper girth of the jib, which has a total length of 96 metres (314·97 feet), an auxiliary revolving crane of 10 and 20-tons' lifting capacity travels. With loads of ten tons, by the aid of this auxiliary crane, a working field of 147 metres (482·29 feet) diameter or about 17,000 square metres surface can be served.

The lifting height of the large, as well as the auxiliary crane, is about 75 metres (246·06 feet).

At a distance of 34½ metres (113·19 feet) from the revolving centre, the large crane may be loaded with

250 tons. Even at 53 metres (173·89 feet) 110 tons can be dealt with.

If it is desired to use the large crab, the auxiliary crane must be run to the extreme end of the counterweight arm, so that the counterweight is increased, whilst on the other hand, it is only permissible to work with the small crane when the large crab has been run right back. If the crane is to be used as a derricking crane, then the large crab must be run right out and bolted in its extreme position. It then serves as a fixed upper pulley block. When the jib is entirely raised, the nose of the jib is at the enormous distance of more than 100 metres (328·08 feet) above water level. For derricking the jib from the lowest to the highest position with a load of 100 tons on the hook, 40-50 minutes are required. The lifting of 250 tons is effected at a speed of about 1·6 metres (5·1 feet) per minute, and the crab travelling with the same load can be effected at about 10 metres (32·81 feet) per minute.

The crane requires only two attendants, one of whom is in the main driving cabin, whilst the other is in the driver's cabin of the auxiliary crane, which is arranged as a completely independent lifting appliance. The driver of the latter can, by means of suitable connections, operate the revolving gear of the large crane without it being necessary for him to leave his place.

The driving of the crane is effected by electrical means exclusively. The Leonard system is adopted, which makes it possible for smaller loads and also the empty hook to be lifted and lowered at a greater speed. Electro-magnetically operated brakes, as well as emergency brakes, which can be actuated from the driver's stand and permit of every movement being instantly stopped, and the load being safely held at any position, are provided in ample numbers.

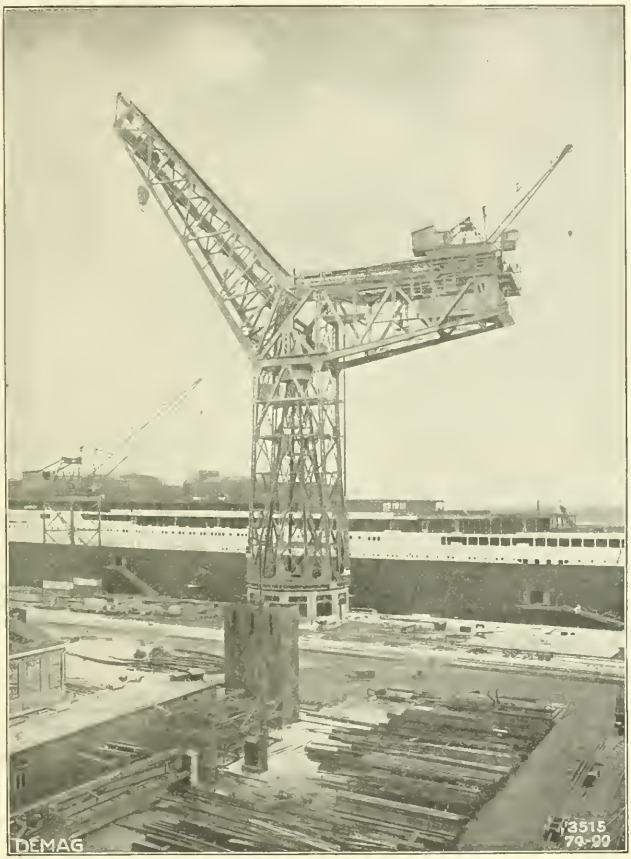


Fig. 2
The Giant Crane erected by The Deutsche Maschinenfabrik A.G., Duisburg, in Messrs. Blohm & Voss' Establishment.

It may be interesting to note that the development of crane building has been enormous during the past twenty-five years. More than 140 giant cranes are in existence in all parts of the world, and of this number more than seventy have been supplied by The Deutsche Maschinenfabrik A.G., Duisburg.

BOILER REPAIRS BY WELDING.

THE official general sanction has recently been given by the Board of Trade to the welding process being used for boiler repairs, so that it may be considered safe and reliable even for critical details. The experience gained on the continent and in Britain during the past ten years has justified the use of the process, yet it is well that caution should be exercised before the official dictum is passed into current practice and this course the Board has followed. In the instructions to surveyors emphasis is laid upon experienced workmen and the testing of the work when completed by hammering the adjoining parts to the weld, cold. It is specified that the process may be used for repairing cracks in furnaces, combustion chambers and plates of boilers, and for re-enforcing landing edges where these have become reduced by wasting or repeated caulking. Repairs to parts of boilers which are wholly in tension, as cylindrical shell plates and stays, weld are excepted. It is further pointed out that in some cases where old furnaces have been dealt with, after a few months' working cracks have developed in adjacent parts, probably owing to fatigue in the old material, hence the need for consideration and close watching in cases of old boilers.

THE FLEETS OF THE MAIL LINES.

(From our own Correspondent.)

The P. & O. Company

is rapidly getting rid of the remaining single-screw vessels of its fleet. Of the ships taken over a year or two ago from the Lund Line two have recently been cast. One of these was the *Narrung*, which has been sold at Hong Kong to buyers in the Far East. She had been thoroughly repaired at a cost, it is said, of £10,000 from the damages which she had sustained in her combat with a heavy sea off Ushant at the end of last year. Hardly had the announcement of this sale been made when the sale of a sister ship, just two years younger, was completed. This was the *Wakool*, built in 1890, at Sunderland, by the Sunderland Shipbuilding Co. for the old Blue Anchor Line. She was of 5,004 tons, exactly, by the way, the size of the famous White Star Line *Britannic*. Then came the sale of the cargo vessel *Ceylon*, built at Middlesbrough for the P. & O. Company in 1894, by Sir Raylton Dixon & Co. She is of 4,094 tons gross. Her departure leaves open a name which for more than half a century has been famous in the P. & O. fleet-list, for the old *Ceylon* was one of the most beautiful and popular ships which ever flew the Company's house-flag. This vessel, after serving in the fleet till she became too small for modern requirements, was sold to private buyers and employed for many years as a public yacht—this being one of the earlier experiments in this class of public entertainment.

Some Russian Regulations.

When the Baltic fleet set out on its fatal voyage to the Straits of Tsushima, the prevailing note of their progress was extreme nervousness, as witness the famous firing of this Invincible Armada on the inoffensive British fishing vessels of the North Sea. It would appear that this terror of merchantmen still permeates the Russian naval breast, for the Board of Trade has just published for the guidance of British seamen a warning which has been issued by the Russian Admiralty as to the course to be pursued by vessels approaching Russian coasts and Russian warships. Indications are afforded as to the signals which will notify the merchantman that she is approaching a Russian squadron or a forbidden strait or bay, and it is enjoined that, when such signal is observed, the vessel must lie to, when at least a mile from the guardship which has displayed the signal, and await her orders. Failure to obey such commands will result in a blank shot at first. If no notice be taken of this hint a shotted gun will be aimed at her rigging, and if that does not have the desired result the offender will be either hulled with a projectile or rammed. Indeed, the rules are somewhat bloodthirsty, as well as very panicky, for we are told that "in places where the movements of ships are limited by the above-mentioned rules, traffic with private motor-boats, hydroplanes and submarines is strictly forbidden, and if these craft venture to approach the guardships they will be *shot to pieces*." In regard to the meeting of naval squadrons at sea the same desire for solitude is evinced. Merchant ships must keep clear of the squadron's course, even in extra-territorial waters, under pain of being fired at. Of course, the Russians have no right to enforce such rules as they are pleased to make, against vessels of other nationalities on the high seas, and if they interfere with foreign ships outside the three-mile limit, there may be diplomatic correspondence and compensation to be paid. But it would seem to be a poor satisfaction as one was being sent to the bottom of the sea by a Russian gun, to know that the owners of one's ship might have a monetary compensation after many days. So on the whole it may be advisable to keep clear of Russian warships, wherever they may be met, until the powers that be in Russia realize in what a ridiculous position they place their Navy by so contemptible a fear of unarmed ships. One is compelled to wonder on reading these notices in what an agony of apprehension must they really be when the look-out reports a foreign warship under steam in the offing.

Disasters.

Since the last instalment of these notes went to press, there have been two occasions in which large passenger steamships have been in distress. The first showed the value of wireless—when there is some one ready to take the distress signals. When homeward bound from New Zealand with a valuable cargo of produce, including a good deal of meat, the Shaw-Savill and Albion twin-screw liner *Tainui* was in collision at 5 a.m. on the 25th May with Messrs. C. T. Bowring and Co.'s steamship *Inca* during a dense fog in the Bay of Biscay. Though the *Tainui* was struck forward of the collision bulkhead, No. 1 meat compartment was flooded and the water began to make its way into No. 2. Accordingly calls for aid were sent off and the ship was headed for Corunna. Meanwhile the call was taken by the P. & O. *Nyanza*, which passed on the news to the land station at Vigo, what time she made at full speed for the scene of the disaster. But before she could arrive at the place indicated a Union-Castle liner, the *Garth Castle* received the message, and being in the more immediate neighbourhood made arrangements to receive the damaged vessel's passengers, as the *Tainui* was developing a dangerous list. The fog was so dense that, though the commanders of the *Garth Castle* and the *Tainui* knew their proximity to one another and their relative bearings, they could not see one another. There was danger, therefore, of the *Tainui's* boats, to which her passengers had been transferred, missing the *Garth Castle* altogether in the thick weather. His boats not being required to aid in the transfer, the master of the *Garth Castle* employed them in another fashion. He threw them out in line at right angles to each side of his own vessel, keeping them in touch with one another by hawsers. They thus extended over a considerable area and ensured that the *Tainui's* people should not miss their way. The *Garth Castle* then having taken the passengers and stewardesses on board, proceeded for Plymouth whilst the Pacific Steam Navigation Co.'s *Galicia*, which had also come up, convoyed the *Tainui* to Corunna, leaving her off that port at 10 a.m. on the 26th May. There she was temporarily repaired and so was enabled to proceed for the Thames on the 2nd June. Thus there was no loss of life and the bulk of the valuable cargo of the damaged ship was saved. The other casualty was the stranding of the American liner *Haverford* off Queenstown on the 29th May, when outward bound from Liverpool to Philadelphia. This disaster also occurred in fog, the vessel, missing the entrance to the harbour—where she was to embark about a hundred additional passengers—struck the mainland in Rocky Bay, outside Robert's Cove, to the north-west of Daunt's Rock. It seems a little difficult to understand how she should have got past the warnings of Daunt Rock's submarine bell, but no doubt the explanation for this will be forthcoming. The vessel was holed and one compartment at least was flooded, It was, of course, necessary to send for prompt assistance, which was easily called up by the vessel's wireless installation. But though tugs were at once sent out it was not so easy for them to find the stranded vessel. When at last they did so, however, a smart piece of work was accomplished, for not more than half an hour was occupied in disembarking the 1,200 passengers whom the *Haverford* bore. The passengers were then landed at Queenstown, and though every credit must be given to those who handled them so promptly without any loss of life or personal injury, it can hardly be said that, as the newspapers proclaimed, "1,200 persons had been saved from the wreck," for nothing would have happened, as it turned out, if the people had all remained on board. By 11 p.m. on the night of the casualty two Clyde tugs and the King's tug *Hellespont* were on the spot and they at once set to work to try and move the vessel. Within twenty minutes of their getting to work the ship began to move and was soon in deep water. At 5.30 a.m. on the next morning the fog cleared enough to enable them to take the *Haverford* into the harbour and in the afternoon the salvage steamer *Ranger* arrived and her pumps were soon at work clearing the two holds, which by this time had been invaded by the sea. By the 2nd of June she was fit for the journey to Liverpool, where she is now undergoing permanent repairs, and she was appointed to take the sailing to Philadelphia on the 2nd July, but the latest advices suggest that she may hardly be ready by that date.

Shipping at Montreal.

It is interesting to learn that the big floating dock at Montreal is not at present a success, and at the same time to hear the reasons which bring the present condition of things about. The dock itself is all that could have been expected, and it is fully equal to any duty that could be laid upon it.

The trouble, however, is that it is idle. This naturally is a serious matter for those to whose enterprise its existence is due, for they are not only getting no return for the expenditure of their brains and capital, but are further being put to continual expense in keeping the dock fit for emergency and manned with a proper staff. The good people of Montreal who clamoured for the provision of the dock are, however, abundantly satisfied. They have a dock equal to coping with the repair of the biggest ship frequenting the port, and thus they have an argument for use against the underwriter to force down his rates of premium. But, save in unavoidable emergency the shipping people seem to have made up their minds that they will not use the dock, as it is fractionally cheaper to dock on the European side. This may be business. But it hardly suits the dock owners. Unless some encouragement be given to them they will assuredly have to make arrangements with the port authorities to give them such a retaining fee as will enable them to offer the services of the dock at such a price as will make it worth shipowners' while to use it, or else they will have to shift the structure to some more hospitable place. Its mobility in fact may yet make the Duke of Connaught Dock a remunerative investment to those who provided it.

The White Star Line.

Announcement is now made as to the changes in the management of the White Star Line, as brought about by the retirement on the last day of June of Mr. Bruce Ismay. For some time the name of the famous firm of Ismay, Imrie & Co. has ceased to appear at the foot of the Line's advertisements. It has also been known that Mr Ismay would be succeeded as president of the International Navigation Company by Mr. Harold A. Sanderson, previously manager of the White Star Co. Now it is disclosed that the post of manager will hereafter go, as it were, into commission, three officials of the Line being appointed to the office. These three are (1) Mr. Henry Concannon, who has recently filled the post of assistant general manager. He is also a director of the International Navigation Company and of the British and North Atlantic Steam Navigation Company. The questions of national defence and of the training of boys for the mercantile marine have long been subjects of deep interest to him. Indeed, under the old *régime* he attained the rank of colonel. He is in every sense a Liverpool man, being a son of Mr. Christopher Concannon, who for many years was governor of Walton prison, and his entry into business life was made in the offices of the Mersey Docks and Harbour Board.

(2) Mr. Edward Lionel Fletcher is also of a Liverpool family, and one who has spent his active life in the White Star service. He was apprenticed to Messrs. Ismay, Imrie & Co. on leaving Eton, where he was educated, and he is now director of the White Star, American and Dominion Lines, actual members of the combine, as well as being on the boards of the Shaw, Savill & Albion and Aberdeen Lines, two Companies now closely associated with the White Star Co.

(3) Mr. Arthur Belcher Cauty was first connected with that old Liverpool Company, the Inman Line, being apprenticed to its then managers, the firm of Messrs. Richardson, Spence and Co. When the Inman Company changed its name and its port of departure, Mr. Cauty was transferred to the London office. In 1899 he came back to Liverpool and joined the James Street headquarters.

Finally, amid the bigger people, Mr. Philip E. Currey, long the manager of the American Line at Southampton, has now been appointed manager also for the White Star Co. at that port.

The South African Mail Service.

So far the only alteration in sailing dates seems to be that on and after the 6th September the homeward liners will leave Cape Town on Saturday instead of as at present on Wednesday. As the present rate of speed will be maintained the result will be that the Cape mails will be delivered on Tuesday instead of as now on Saturday afternoon. Thus letters will leave some three days later than they do under existing conditions, but it will still be possible to despatch the answers by the same mail as they are now sent, because the incoming mail at present arrives just too late and there is a week for answering. After September there will be four days between the arrival and despatch, which should give business men ample time for all their correspondence. Whilst this alteration is made in the mail sailings it is also to be noted that there is a change in the days of despatch on their outward voyages of the East African liners. Commencing with the departure of the *Guelph* on the 4th June these vessels will leave Middlesbrough on Wednesday instead of Saturday, London also on Wednesday instead of Saturday; and Southampton on Thursday instead of Friday, their itinerary throughout being thus a day earlier than heretofore. This Company, by the way, has recently issued two extremely well-illustrated and interesting guide books. One deals with its pleasure cruises, which now cover a great many places of interest. The intermediate steamers which go across the North Sea to load for their ocean voyage offer a ten days' rest with a fine ship as a hotel in foreign ports. Hamburg itself is intensely interesting, and within reasonable distance of such an old-world seaport at Lubeck, whilst it is also not a long journey by rail from Berlin. Then there is Antwerp, which opens up all Belgium to the tourist, and Rotterdam for those who love Dutch surroundings. Other tours now afford conveniences by the East African liners to visit the Mediterranean as far as Egypt. By the mail steamships for South Africa Madeira may be visited on an all too short voyage in a great and well-appointed ship, whilst the intermediate liners—which, if a little slower and smaller, are quite big enough for comfort and more restful than the mail boats—take one to Teneriffe and Grand Canary. The other volume deals with the voyages to South Africa, and the places of interest and importance to be reached by the mail steamships, whilst another portion deals with the more fascinating, because less known, regions to be reached from such ports as Mombassa. Here is set out the wonderful story of the Uganda railway and a description is given of the delightful country of the Masai, where, owing to its elevated situation, the advantages of a temperate climate are afforded in the tropics.

BOATS AND DAVITS COMMITTEE.

THE report of the members of the Committee appointed by the Board of Trade has now been published. The Committee explain the conditions under which they consider the provision of decked life-boats and motor boats to be desirable. If the latter are provided they should have sufficient fuel to give them a minimum radius of action of a hundred miles. Boats should of course be life-boats, and pontoon rafts, though not actually condemned, are discouraged by the statement that, in regard to home trade passenger ships, as large a proportion as is reasonably practicable of the life-saving appliances should be provided in life-boats. Some attention is given to the question of the distribution of the life-belts in the ship, whilst the stowage of the boats is also dealt with. The desirability of providing means for launching some at least of the boats from either side of the ship is emphasized. Means for bringing the boats under the davits are discussed, as well as proposals for carrying such boats on more decks than one. Suggestions for the substitution of derricks for davits seem to have found favour with the committee. In regard to the working of the ship in times of emergency, they refer to the enormous part which the discipline and *morale* of the officers and crew must always play. They discourage the allotting of passengers to special boats at the beginning of every voyage in view of possible casualty, and they also suggest that when embarking passengers from a sinking ship the people should be mustered on the lowest open deck, the boats being lowered to that level to receive them.

INSTITUTE OF METALS.—Gentlemen desirous of attending the Ghent Meeting of the Institute of Metals should send in their Forms of Application for Membership to the Secretary of the Institute of Metals, Caxton House, Westminster, S.W., at the earliest possible moment, and not later than July 31st.

WENNERITE INSULATING MATERIAL.

A NEW heat non-conducting material has been put on the English market by The Wennerite Steam Insulating Company, of 31, High Holborn, London, under the title of Wennerite. This material does not contain any inflammable or combustible material, such as wool waste, sawdust, cow hair, felt, peat dust, and like matter, but consists essentially of flue dust collected in gas scrubbers and which dust has been subjected to a temperature of about 1,500° centigrade. The further preparation of the material is such that millions of small self-contained air cells are formed, the uniform distribution of which is not interrupted and disturbed by fibrous or tissue-like matters mixed therewith for the purpose of forming loops or knots for building purposes. As to its covering power per unit of weight it is found that one cwt. of Wennerite will cover about 21-22 square feet of surface with a layer of two inches thickness. As to its efficiency as a heat non-conductor, if the radiation loss from an uncovered pipe is 100 per cent. when covered, the loss is only 14 per cent. with saturated steam, thus saving 86 per cent. of the heat from passing away from the pipe, and with superheated steam the saving is about 90 per cent.

This material has been used largely by the Imperial German Government and in the German and Russian navies, as well as by many large manufacturers having steam plants. It is claimed that the high efficiency of the material is due to its property of swelling up when mixed with water, thereby producing the highly air-permeated, but otherwise thoroughly uniform, structure. It is important that the whole thickness of the lagging can be in Wennerite and thus an under coating of insulating material of low efficiency can be entirely avoided and the total thickness of lagging reduced accordingly for the same non-conducting duty in each case.

NAVAL MATTERS—PAST AND PROSPECTIVE.

(From our Own Correspondent.)

Portsmouth Dockyard.

FINDING that the increases in pay which have been authorized by the Treasury do not come up to their expectations, the workmen in this yard have changed their tactics somewhat. The fact seems to be that the Admiralty, by discriminating between the various trades, and giving some a larger increase than others, instead of making a similar rise all round, have more or less destroyed the strength of the combination. An equal increase to all classes might have kept the men united, and would not have revived trade jealousies and animosities. As it is, the unskilled workmen or labourers, having received the smallest amounts, are naturally most anxious to continue the agitation. If there is much further dissatisfaction, it will in all probability be mainly due to the system adopted by the authorities of levelling up, and increasing the lower rather than the higher rates of pay, a plan which operates much less favourably in some classes than in others. In the meantime, the strike has come to an end, and work has resumed its usual course. It was fairly certain that this would follow as soon as some of the classes were more satisfied than others, and apparently the shipwrights and several other branches of workmen consider that they have been conceded the larger part of what they asked for. In addition, it must be said that the pressure of work in this yard has now eased off, making overtime less necessary, while day and night shifts have almost ceased. The event of the month is the visit of the French President in the new battleship *Jean Bart*, with a squadron of cruisers and destroyers. Professional interest centred in the new battleship, because she belongs to the first pair of armoured vessels built in France on the "Dreadnought" principle. Visits of French squadrons are few and far between, but our neighbours' seamen always receive a hearty welcome. A fine contingent of the latest vessels of the British Fleet came to Spithead to greet the visitors, and among many items in the programme of hospitality was an inspection of the yard. The *Queen Elizabeth* should soon be ready for launching, but there has been delay in the delivery of material. On this vessel, and on the *Iron Duke*, a larger number of men are now employed than has been the case for some time past. The great floating dock was shown to the visitors, the latest vessel to use it being the *Bulwark*, which has been undergoing an overhaul. Nearly all the big ships which have been in hand for repair have now left to rejoin their squadrons. Of new ships, the *Ajax* and *Queen Mary*, which have been here for their trials, have again taken their departure. The former returned to Greenock on May 21st and the latter to the Tyne on June 12th. The *Queen Mary* particularly excited much interest. Ships which have recommissioned here during the past month are the *Albemarle*, which has taken the place of the *Revenge*—now turned over, like her sisters, to the Material Reserve—and the *Achilles*, which paid off on June 4th and rehoisted the pennant next day. She has since left to join the Second Cruiser Squadron. Some overtime is being worked on the scouts *Sentinel* and *Skirmisher*, as these vessels are to be completed for the manœuvres. The *Latona* and the usual number of small craft are also in hand. Towards the end of June, the King, it is understood, will pay a visit to the yard for the purpose of inspecting the *Australia* and the *Sydney*, vessels of the Royal Australian Navy, but at the time of writing the arrangements for the visit have not been made known.

Devonport Dockyard.

The strike against overtime, which was first started in this yard, has come to an end, and curiously enough just at a time when the necessity for overtime is less strong than it was a while back. However, this is not the reason assigned for abandoning the strike. The engineers, who began it, admit that it could hardly have been continued in face of the considerable concessions which have been made. Probably also there is not that general feeling against overtime which the strike might have implied. Originally, it was entered into as a protest against an alleged delay on the part of the authorities in responding to the men's petitions, but now there are signs of a movement in favour of abolishing the system of petitions altogether. It would appear that at the other yards there is also a movement under way in favour of promoting a federation of all the dockyard workmen, so that by a combination the claims of all classes may get equal consideration. It is manifest that this movement is one mainly in the interests of, and supported by, the unskilled men, who have been less satisfactorily dealt with from their own point of view, and it appears unlikely that the engineers and shipwrights—to mention only two classes—will care to join such a federation. They are well able to prosecute their own claims, and stand to lose by joining hands with the unskilled workers. It is rumoured also that as regards the skilled tradesmen there will be a further extension of the establishment before long, and it is not probable that men on the establishment, with its additional advantages, would join in a general strike, however far they may have gone into the present agitation when it was merely partial. So far as ships on the slips are concerned, such delay as has occurred has been due to non-delivery of material rather than to any other cause. There has, however, been more activity apparent recently, and it is expected that the *Aurora* may be ready for launching next month. The *Warspite* may be behind time a little. As to the *Marlborough*, several of her guns and part of her propelling machinery has arrived and been put in place, and there are indications that she may soon be ready for undocking. The oil-carrying ship *Carol* will, it is expected, be ready for launching early in July, and the sister ship *Ferol* will be immediately begun. The *Carol* is, like all these oil ships, to be fitted with internal combustion engines

Much interest was aroused by the visit of the *Queen Mary* for her steam trials. This fine cruiser arrived on May 22nd, and was so expeditiously docked that she was ready to make the tests several days earlier than was expected. She completed her runs most successfully, and then went on to Portsmouth for gun-mounting trials. The commissioning of the *Centurion* on May 22nd and her departure released more men from the ships building, and the training cruiser *Cornwall*, after an overhaul, was inspected by the Commander-in-Chief and left on May 28th for Christiania. Of ships in hand for repairs, refit, etc., the *Attentive* and *Adventure*, which have been re-tubed and re-armed, are now nearly ready for the manœuvres. The *Exmouth* arrived on June 9th to relieve the *Magnificent* as gunnery training ship, and the latter vessel, on what must be nearly her last trip, touched the ground as she was returning to the Sound on June 16th, fortunately without any material damage. As usual just before manœuvres, there are a rather larger number of small craft in hand, including the *Violet*, destroyer, which has been in collision.

Chatham Dockyard.

Criticism of Dr. Macnamara's statements when he announced the Admiralty concessions still continues, but there can be no doubt that many of the workmen affected by the principal rises are fairly satisfied by what they have obtained. There is talk about continuing the agitation, but the backbone is out of the movement, and work of all kinds has been resumed as usual. It is the labourers only that still nourish a strong grievance, and although there is a good deal of sympathy expressed for them by the skilled trades, it is unlikely to take any strenuous form. More interest seems to be felt at the present moment in the proposed amendments to the agreement between the Admiralty and its workmen in regard to compensation for injury. The Workmen's Compensation Act has expired, and a new scheme has been drafted. Dr. Macnamara, in submitting this scheme to a conference of representatives from the yards, made the following announcement. "We cannot, and we do not wish to, make it any disadvantage to a man's appointment that he should accept this or any other scheme. He must decide for himself. Further, if he is in this scheme, if he accepts it, he can substitute the Act for it at any time, by signing a form which permits of his withdrawal from the scheme." This is generally regarded as a fair proposal, and it is thought that the scheme should work favourably for the men. There remains, however, the question of an outside court of appeal, but even here the Treasury has gone very far to meet the men's wishes. It will in future accept the opinion of an injured workman's panel doctor, and submit it, with that of the naval surgeon, to an independent medical referee, or a County Court judge will be asked to appoint a referee. In connection with these arrangements, a new departure was taken which may have a far-reaching effect upon the general relations between the authorities and their employees. For the Conference upon the scheme, representatives were chosen to meet the Admiralty from the various establishments. These men were paid for lost time and granted subsistance money and railway fares. In a measure, therefore, the Conference was substituted for the old system of petitions, and this is regarded as a much more suitable method of settling disputes. It may even be the first step towards the formation of a wages board, which is what so many of the tradesmen regard as essential to speedy and amicable arrangements between themselves and the Admiralty. As indicated last month, there has been a considerable clearance of ships from this yard, but the places of those which have left the basins have been taken temporarily by vessels getting ready for the manœuvres. There is a very satisfactory amount of work in hand. Progress on the *Arethusa* and *Lowestoft* is steadily advancing. The *Leviathan* arrived on June 2nd and will pay off on July 1st to undergo a long refit. The *Cressy* arrived for docking and is still in hand. Another vessel which will employ a number of hands for some time is the *Highflyer*, which returned from the Cape Station to pay off on June 14th and is to be prepared for use as a cadets' training ship, a billet which she filled some years ago. The *Forte*, another ship which returned from foreign service, has paid off and been drafted to the Material Reserve. The surveying vessels *Triton*, *Esther* and *Daisy* have been commissioned for their summer cruise. Extra time is still running on the scouts *Foresight* and *Forward*. The former returned here after an unsatisfactory trial on June 11th, and the latter has gone to the Nore in order to undergo a test of her machinery after retubing.

Sheerness Dockyard.

The overtime protest has now been abandoned, and although the concessions made to the workmen by the authorities have not given unqualified satisfaction to all, there is a general sense of relief at the resumption of normal conditions. It is probable that many men threw in their lot reluctantly with the majority, and these are glad that the strike is over. The new scheme of compensation has also been favourably received. The usual rush of work before manœuvres is on, and everyone is busy. There have also been more ships in the harbour of late, and this always makes for a more lively time. Then, too, the departure of the King and Queen for Germany and their return home gave some opportunity for a display of ceremonial not often seen at Sheerness. Of the vessels passing through from or to Chatham, the *Implacable* and *London*, battleships, have gone to Portland to rejoin their squadron, the *Jupiter*, of the Eighth Battle Squadron, has gone to Milford Haven, and will shortly be followed by the *Albion* and *Canopus*, as soon as their defects have been made good, while the *Duncan* has left for Portsmouth to relieve the *Dido* as gunnery training ship. The *Forte*, *Highflyer* and *Dwarf*, all from foreign service, have passed up the river to pay off. Admiral Hamilton, who has rehoisted his flag in the *Queen*, took his squadron, with a flotilla of destroyers, to Dover to salute the French President on his return passage across the Channel. The *Lord Nelson* is to come here to pay off on June 30th, and she will recommission next day for further service in the Second Battle Squadron. If, as last year, this port is allotted a place in the manœuvre area, there will probably continue to be a good deal of movement, and the usual repairs to small craft which are inevitable on such occasions.

Pembroke Dockyard.

This yard has the reputation of bearing the palm for grumbling, and no one who knows anything of its history will deny that in the past there has been ample cause. It is probably because the old grievances still rankle that there seems to be less disposition here to be satisfied with the recent Admiralty concessions in the matter of pay and provision for accidents than elsewhere. Generally the advances which have been made appear to have been regarded only as an instalment to be accepted for the present, but with the reservation that more is wanted and should be obtained later on. The circumstance, however, that some classes are more satisfied than others could not fail to have a quieting effect upon the agitation, and for the present the movement to obtain a further increase has lost strength. Where it will continue to be felt is in connection with additional entries. For example, although 100 shipwrights are required for this yard, and the fact has been widely advertised, nothing like this number have entered up to the present; yet this is one of the classes which have benefited more than others by the recent increases of pay. On the other hand, it is years since the yard was so well off for work, both actual and prospective. To the *Fearless* and *Nottingham*, completing, will shortly be added the new cruiser which was described last month. Now, too, that the oil fuel lighter has been launched from No. 5 slip, the construction of the *Trefoil* can be pushed on, and when she is launched, her sister ship, the *Turmoil*, will be begun. There are always at least two, and sometimes more, destroyers in hand, and in this respect there is little to complain of. Then there is a second light cruiser to be laid down, although up to the present appearances are against this happening until after the launch of the first one or the *Turmoil*. This does not include all the items in the programme for the year, and it is likely that the presence of the Eighth Battle Squadron, of which the *Goliath*, *Jupiter* and *Ocean* have already arrived in the Haven, will give occasion for additional work.

The steamship *Ridley*, owned by Messrs. Stephens, Sutton and Stephens, and which recently went on her trial trip, had an Aspinall's patent governor fitted to her engines.

AWARD FOR BRAVERY.

In the premises of the Marine Engineers' Institute, Nanking Road, Shanghai, on May 13th, an interesting ceremony took place in the presence of a large gathering of the shipping community and friends. The ceremony in question was the presentation of the Stanhope Gold Medal, awarded to Mr. D. Palmer, chief engineer, China Merchants' Steam Navigation Co., by the Royal Humane Society, for his gallantry in rescuing Jas. Smith, an officer, from the wreck of the steamer *Meifoo*, off Elgar Island, on the Chinese Coast, this action being defined by the Society the most meritorious reported during the year.

Mr. Wilmer, Secretary of the China Coast Officers' Guild, who was called upon by the chairman to state the circumstances of the rescue, explained that Mr. Palmer, chief engineer, was the means of saving the life of a brother officer from the wreck of the *Meifoo*, and the Officers' Guild considered that the action should be brought to the notice of the Royal Humane Society; this resulted in the Silver Medal and Certificate of the Society being awarded and sent out from London to Mr. Palmer. Subsequently in considering the cases of the year, amounting to nearly 1,000, it was decided to grant the further award of the Stanhope Gold Medal, a distinction given in recognition of the bravest act of the year. The officer whose life had been saved was present and being a member of the Guild, it was a fitting opportunity to express the wish that the ceremony would be a means of still further cementing the good fellowship between the two departments of the Steamship, and that they would work together for mutual aid and protection, as had been the case at the wreck of the *Meifoo*. Had the presentation been made in Britain, probably the King would have given the medal, but the King's Representative, Sir Everard Fraser, whom they were pleased to see present, had undertaken this duty. Sir Everard Fraser, before handing the medal to Mr. Palmer, further explained that while on the way from Hong Kong to Shanghai, the *Meifoo* encountered fog, and the steamer anchored. Meantime the *Kwanglee* left Shanghai and soon entered the fog, but as it appeared to be clearing she proceeded, only to re-enter and crash into the *Meifoo*. Amid the fog and the silence, Mr. Palmer bravely swam to the rescue of his brother officer, supporting him for a considerable time before he gained a footing. After reading the certificate from the Royal Humane Society, which accompanied the medal, Sir Everard concluded by saying "I think Mr. Palmer will hand this down to his family as an heirloom. This is the medal, but it is not within my function to pin it on his breast. But I have very great pleasure in handing it to him." Mr. Palmer, in thanking the Consul-General for presenting the medal, said he had only done his duty as any other British officer would have done. The toast of Mr. Palmer's health was then given amid music and cheers, and the ceremony was closed with a vote of thanks to Sir Everard Fraser. We are indebted to the courtesy of Mr. W. Milner, Secretary of the Marine Engineers' Institute, Shanghai, for the report of this presentation.

INSTITUTE OF MARINE ENGINEERS.

VISIT TO THE WORKS OF MESSRS. R. GAY & CO. AND ROBT. INGHAM CLARK & CO., STRATFORD.

ON June 6th, a visit of inspection was paid by a party of members of the Institute of Marine Engineers to the Paint and Varnish Works of Messrs. R. Gay & Co., Ltd., and Robt. Ingham Clark & Co., Ltd., Stratford. The works are situated on the site of the old abbey of Langthorne, and a portion of the old abbey wall, dating from the year 1435, forms a small part of the surrounding wall of the works. The firm enjoys a high reputation for the quality of varnish produced and it was this part of the works which proved of especial interest. It consists of about 25 buildings of moderate dimensions, so constructed that the windows of one building do not face those of another. This formation is adopted in order that any building may be readily isolated in case of fire and a very efficient and well-equipped works fire brigade is a further precaution against such an event.

Previous to the inspection of the works, the visitors were shown various specimens of the fossilized gum which forms the basis of the varnish. Only one kind of annual gum is used, the remainder being in a fossilized form, up to 2,000 and 3,000 years old, and requiring a temperature of about 600° F. to melt. After visiting the gum stores, containing supplies of varying qualities and colours, the heating room was inspected. Large steel cauldrons containing the gum are placed over sunken fires at a high temperature. About 25 per cent. of the material is given off in fumes, which are drawn through pipes by means of electrically-driven fans. These fumes are condensed and the residue sold for commercial purposes. The remaining liquid, after a process of filtering and straining is conveyed to the maturing warehouse, which has a total tank capacity of 45,000 gallons, where it is left for a period of from 9 to 12 months to mature. The total output of varnish from the factory is about 500,000 gallons per annum, and of this a large quantity is exported, the Colonial and Continental warehouses showing the extent of the business done apart from the home trade. The manufacture of the "Pearline" enamel was then shown, the mixing, grinding and other machines being electrically operated. The preparation of linseed oil was also a process which excited much interest. The paint factory, in which about 250,000 gallons are produced annually, was next visited and an opportunity was given of seeing the various processes of manufacture. A speciality in this department is the orange red lead made by the firm, which, in addition to having special preservative qualities, retains its original colour for long periods under exposure to the weather. The firm also specializes in the manufacture of zinc white paint for decorative purposes, and this also was shown in process of manufacture. In the handsome exhibition room were seen beautiful specimens of the work accomplished with materials manufactured by the firm, also specimens of the raw materials, etc. A photograph of the party was taken, after which refreshments were generously provided. A vote of thanks to the Company, and to Mr. Clark, Mr. Barford and other gentlemen under whose guidance the visit was made, was heartily accorded on the proposal of Mr. Jas. Adamson (Hon. Secretary), seconded by Mr. Jas. Shanks.

MR RICHARD HALL.

MR. RICHARD HALL.

DEEDS, not words, has become a synonym with naval men generally, and perhaps engineers in particular. While Mr. Hall has served the Bibby Line for seventeen years, during which time he has sailed in eleven steamers and in seven as chief engineer, yet he characteristically put it that his life has been uneventful. There must be many an incident crowded into this period of service which Mr. Hall could speak of. The Bibby Line steamers are known to be favourite vessels in the Eastern trades and are all first-class twin-screw vessels. The four latest vessels, including the *Oxfordshire*, were superintended by Mr. Hall at Belfast during construction. Previous to going to the Bibby Line Mr. Hall, after serving seven years' training, was for a short time in a tramp steamer and also saw some service with paddle boats. We congratulate Mr. Hall, who has recently been appointed engineer-superintendent to the Bibby Line, in succession to Mr. James Johnstone, who retired at the end of 1912.

MR. NORMAN M. HUNTER.

MR. HUNTER, who has been appointed manager of the New Elderslie Yard on the Clyde, has for the past three years held the position of manager at Messrs. Cammell, Laird & Co.'s Tranmere Yard. A native of Armagh, Mr. Hunter began his service as a premium apprentice with Messrs. Workman, Clark & Co., of Belfast, with which firm he rose to occupy the post of manager of their South Yard, the many qualities possessed by Mr. Hunter causing him to be thus promoted during a term of fifteen years' service. The work supervised by Mr. Hunter in this yard included vessels of large size for the Peninsular and Oriental Steam Navigation Co., The City, Shaw Savill, Booth, Royal Mail Steamship Companies, also Lamport & Holt and a large number of boats for The United Fruit Co. of America. During the period spent in Birkenhead, Mr. Hunter has had charge of a varied and important class of work, including one of the largest floating docks, a battleship, and cruisers, the latter for the Australian Government, also large Atlantic and cross-channel steamers. Mr. Hunter, who is an assiduous worker and possessed of great energy and organising ability, is esteemed and respected by masters and men, and it is with sincere good wishes that Mr. Hunter leaves Birkenhead for Clydeside.

Mr. and Mrs. Hunter were recently the recipients of a handsome presentation from his many friends and fellow-members of the staff.

DUTCH SHIPPING EXHIBITION.

IN connection with the festivities going on all over Holland this year Amsterdam is holding the first Dutch Shipping Exhibition. This exhibition is on a large scale for one devoted to a single subject and the only thing to which exception might be taken is the lack of provision for those who do not know the language; abridged catalogues in other languages would meet this need, or the various exhibits might be labelled in the chief tongues. While this is excusable in an exhibition in Holland, provided mainly for the Dutch, no excuse can be offered for nearly all the labels on the exhibits of the British section being in English alone; this is all the more to be deplored as the Dutch catalogue does not include this section and very few of the stands have attendants.

The British section has a pavilion to itself and is very well got up, although, at the time of our visit a number of the exhibits were still in their travelling dress.

In this section there is a good historical exhibit arranged by the Society for Nautical Research.

Sir W. G. Armstrong, Whitworth & Co., Ltd., have a fine exhibit, one interesting section of which is composed of train ferries. In one of these the ferry is capable of taking three lines of cars abreast, having for the greater part of her length three parallel sets of lines, all of which sweep to the centre of the vessel at the extreme ends, so as to connect up with the shore lines; another ferry is capable of carrying four strings of cars. One car ferry is arranged for a tidal port, as a car-lift is fitted for raising the cars to the quay level at all tides. One of these train ferries is an ice-breaker with a tractor screw at the bow, in addition to the two propellers at the stern. Two other ice-breakers are shown, one with twin, the other with triple screws; there is also an ice-breaking tug. This firm has in addition a very fine exhibit of war vessels for various navies, together with an imposing array of Japanese war vessels, either built or armoured by the company; these are shown in miniature in a model harbour.

The Welin Davit & Engineering Co., Ltd., have an interesting exhibit, well catalogued both in English and in Dutch. Besides the Welin davit in its different forms, a type of lifeboat is shown which, besides being easily "nested," has seating accommodation for 100 persons. Other items are the non-topping blocks and a "dead" or non-spinning rope of "Twink" brand, whose great advantage is readily seen when it is remembered that with davits which have to lower more than one boat, the difficulty due to the spinning of the lower block may mean serious delay in getting the block on board again, and ready for the lowering away of subsequent boats. Then they have a boat-lowering apparatus which can be controlled by one man.

Messrs. John Brown & Co., Ltd., of Glasgow and Sheffield, have a striking exhibit embracing models of two first-class cruisers, British and Japanese, also of a British first-class cruiser. An interesting part of their exhibit is a machine gun capable of firing 400 shots a minute, rejecting automatically the empty cartridge by means of the recoil, which also sets the trigger and brings a full cartridge into line. This recoil is taken by a spring, so that little is felt, even when a butt is fitted and the gun is used in the position suitable for firing when lying in a trench. It can also be worked in a sitting or a standing position.

Messrs. N. Hingley & Sons, Ltd., of Dudley, exhibit anchors, cable-links of great size, iron piers, etc.; also a figure-of-eight knot tied cold in a bar of "Best Lion" iron five inches in diameter.

Messrs. Vickers, Ltd., have a large and varied exhibit, both in vessels and in ordnance. They show an armoured cruiser for Japan, armoured river monitor for the Brazilian Government, a first-class cruiser for the Russian Government

and a first-class battleship for same. Then they have a floating dock for Rio de Janeiro, with a battleship on the blocks. The ordnance display is good, with mules carrying field-guns, etc.

The Parsons Marine Steam Turbine Co., Ltd., show a model of the *Turbinia*, also models of 2, 3, and 4 shaft arrangements, some of them geared; they also exhibit a pinion such as is adopted with geared turbines.

Messrs. Wm. Hamilton & Co., Ltd., of Port Glasgow, have a good exhibit, which includes a model of a vessel built for an Amsterdam firm, and of a floating dock for that port; this sort of exhibit must appeal to the Dutch. The firm also shows models of three vessels which are built to the longitudinal system, as a note in parenthesis states.

It is a pity that in the British Section of such an exhibition there is very little exhibited which marks recent strides in Naval Architecture. We certainly have the Monitor Corrugated ship, the Side Tanker (Messrs. Wm. Gray & Co., Ltd., of West Hartlepool), the Welin Davit, etc., but we would have welcomed exhibits showing the Isherwood system, the new patent bulkheads, the Cantilever-Framed vessel and other types of ship which strike an original note.

There are many other exhibiters of note, but the above will show the general excellence of the section.

The grounds of the exhibition are nicely laid out, and in one part at least are well-wooded. The general effect of that part of the ground given over to "Old Amsterdam" is good, and is very interesting as it reproduces the old buildings, canals and bridges.

In the Amsterdam Port Pavilion models are shown of the timber harbour and of that part of the port entirley given over to petroleum. The growth of trade of recent years is shown impressively by the difference in size of model bales in the case of tobacco, of model cattle in the case of hides, of steamers to illustrate the growth of shipping, etc. In this section the Commercial Intelligence Office has a branch. This bureau is subsidised by the Dutch Government, and endeavours to extend the trade between Holland and other countries by disinterestedly getting agents for shippers, etc. A noteworthy feature is that of some excellent marine paintings which are used in the wall decoration. The Dutch exhibits without exception are good, embracing full-sized models of many parts of a ship, and in many cases the parts themselves—complete shafting and propeller of a liner, conning tower and firing bridge of a cruiser, torpedo tubes, etc.

Lloyd's Visitation Committee on the Clyde.—The members of Lloyd's Register Visitation Committee paid a visit to the Clyde district establishments, where work, both as regards ship construction and engine and boiler making, over which this Society has jurisdiction, is proceeding. The visit extended over the better part of two weeks, from 9th to 21st June, and their tour embraced almost every shipbuilding and engineering works in the Clyde district. It is seven years since the last visit of inspection by the committee to the Clyde was paid, *viz.*, in June, 1906. The vessels under construction in the district at that time represented a total of 551,000 tons gross, while now the volume of work on hand aggregates over 750,000 tons. This amount of tonnage is much greater than has ever before been under construction in Clyde yards at one time, and the proportion of the total which is to be classed with Lloyd's Register is also a record. Everywhere the members of the committee and the local representatives who accompanied them were received with the greatest cordiality and kindness. In the seven years' interval since their previous visit they find that great developments have taken place in the productive capacity of nearly all the yards, improved methods of construction have in many cases been adopted, and the high standard for which the Clyde is famous has been fully maintained.

Amongst the recent orders received by Messrs. Sir W. H. Bailey & Co., Ltd., Albion Works, Salford, Manchester, for their "Köster" patent air compressors, is one direct-coupled electrically-driven set for 500 cubic feet per minute for Messrs. Sir W. G. Armstrong, Whitworth & Co., Ltd., Manchester.

LIVERPOOL EXHIBITION.

In some respects the present industrial prosperity may be attributed to the spirit of publicity generally prevailing. One form of this spirit is well represented in the Exhibition now being held in the city of Liverpool. Twenty-five years have elapsed since the last Exhibition was held here. The site of the present one is on the Edge Lane Hall Estate and, including Tournament Hall, is of 30 acres in extent.

The principal erections consist of the Palaces of Machinery and Electricity, Industries, Applied Arts, the Grand Restaurant and old Chester Street. The whole of the buildings have been erected from designs of Thomas Ramsay, Esq., architect, of Glasgow, who was also responsible for the designs of the buildings of the Edinburgh 1908 exhibition.

The Palace of Machinery and Electricity—which faces the music court—is 250 ft. long by 70 ft. wide, in the centre of which is an octagonal hall. The Palace of Industries is situated upon the high ground and thus dominates the whole Exhibition. This building is 350 ft. long and 150 ft. wide and has a tower 150 ft. high, flanked by domes. The other main building is the Palace of Applied Arts, which also faces the music court and is of the same size as the machinery hall. We do not intend to deal with the excellent means used for catering for the amusement of the visitors, which are on a lavish scale, but shall confine ourselves to a brief description of the various engineering exhibits. These, of course, are chiefly centred in the palace of machinery and electricity. Situated in the centre of this hall is a fine exhibition of printing machinery in operation.

Messrs. Charles Birchall, Ltd., of James Street, Liverpool, the proprietors of this stand are, besides being high-class printers and publishers, also the proprietors of the "Journal of Commerce" of Liverpool and London, established in 1826, and are also the official publishers and printing contractors to the Exhibition. A complete printing works is shown in operation for carrying out high-class printing with all the latest labour-saving devices, which go to make up a most interesting exhibit.

Some very interesting exhibits are shown specially relating to specialities for use on shipboard. Messrs. A. Campbell and Halstead, of Cumberland Basin, Bristol, show a double buoyant seat, which is strongly made of teak and when not in life-saving use is used as a deck seat. When in use as a buoyant apparatus the top part is lifted off the bottom, each half being fitted with four yellow metal tanks. The whole seat is capable of supporting thirty-six persons and under test has exceeded the Board of Trade requirements by 150 per cent. The overall dimensions are 6 ft. 2 in. by 3 ft. 9 in., height of seat 18 in. This compact and efficient seat has been fully approved by the Board of Trade.

Mr. F. Beart, of Godmanchester, Huntingdon, shows a very ingenious and efficient collision mat. This mat consists of two parts, a folding framework constructed of closed metal tubing and wire work, and a rolled mat, both easily stored in any convenient position on board. The framework being partly buoyant is worked over the apertures and unfolded automatically. The mat, which is larger than the framework, is then allowed to unroll by gravity and suction over this framework and thus effectively stops the water. Ropes would then be passed under the ship's bottom and made fast. This ingenious contrivance may be used also as a canvas boat. Recent experiments with this mat have been made in connection with sluice gates on canals and have proved remarkably successful. Mr. Jonathan Armstrong, of 18, Crooked Lane, Liverpool, is the local agent for Mr. Beart.

Messrs. Allan Cruikshank, Ltd., 67, McAlpine Street, Glasgow, have a fine display of Perelyss Du Borden and liquid fire extinguishers, canvas hose, all kinds of rubber and canvas hose and couplings.

Mr. Wm. John Greenfield, of 12, The Quay, Waterford, exhibits a remarkably efficient gear for the stowage and lowering of ships boats. The boats are nested upon a strong platform with a runway overhead. This platform can be set at any level to correct list of ship and can also be run a considerable distance outward by means of gearing. This enables all the boats to be lowered from either side at will. The boats being filled on the platform are travelled out in turn, being then lowered by swing davits and released by

means of any special gear, a very large outreach is thus obtained.

MESSRS. WAILES, DOVE & CO., LTD., show on Stand No. 271 an interesting set of models, photos, etc., depicting some of the many uses to which their famous "Bitumastic" enamels, coverings and solution are put. A model of a ship's section, also a model workshop with smoke stacks, etc., showing the different buildings covered with their specialities. Photos of various large contracts are shown, including one pair of deck gates on the Panama Canal, forty-six pairs of which will be thus covered, giving an area of three million square feet.

THE RAPID STEEL CO., of Liverpool, have a display of their special high-speed steel, which is stated to exceed that of other steel by 50 per cent., and MR. R. GRIGON, of London, has a remarkable display of sawn wood puzzles, showing them in course of manufacture.

THE BRITISH PETROLEUM CO., LTD., have an instructive stand containing a model of an oil-drilling plant, a railway tank truck and the oil tank steamer *Euplectela*, etc.

MESSRS. DAVID THOMPSON, of Edinburgh, have in operation a large display of all kinds of machinery used in making and baking all kinds of bread and confectionery. Some most ingenious box-making machines and a magnetic pulley separator are shown in operation by MESSRS. JAMES HAWLEY, LTD., of Derby Works, Liverpool, at stands 260-1. To any one interested in these matters a visit will be well repaid, an attendant giving a constant display.

Passing from various other general stands we come to the electrical exhibit. Two large stands are occupied by MESSRS. THOS. ANDERSON & CO., LTD., of Derby Road, Liverpool. Portable electric drills, portable motors, patent coupling boring bar, asbestos and asbestos goods, pilot packing for high-pressure work are shown. Anderson's auto-Morse lamps, semaphore for marine signalling, ozone producer, valves, special spanners and a host of specialities, both electrical and mechanical, are shown for shipboard and workshop use.

THE WARDLE ENGINEERING CO., of 196, Deansgate, Manchester, have a well fitted up stand showing electric fans, lights, heating and cooking appliances for every use on ships; to naval architects and others much of interest is to be seen, and on Stands 263 to 270 THE LIVERPOOL AND DISTRICT ELECTRICAL CONTRACTORS show a remarkably fine exhibit of every variety of electrical fittings, both for ship and land use. Some fourteen firms are represented, while the stand is provided by the Liverpool Electric Tramways and Electrical Power and Lighting Committee. While the extent of the exhibits in this building is not perhaps very great, it is of very general interest.

Other engineering exhibits are to be found in the Palace of Industries, and amongst these may be noticed the stand of MESSRS. J. W. RAY & CO., nautical instrument makers, of South Castle Street, Liverpool, whose exhibit is of special interest from the marine standpoint. Various special instruments used in the navigation of a steamer are displayed upon a vessel's bridge, with a realistic seascape as a background, showing a vessel Morse signalling a message in actual practice. A patent automatic engine reply telegraph, by means of which the actual direction of the engine's movement is conveyed to the bridge as a reply to the bridge order is shown. Two semaphores, all parts of which are non-magnetic, are placed close to the firm's special standard compass, without causing the slightest deviation of the needle. The P.D.M. Pelorus has special tables of angles by which the actual distance that a vessel will pass off a point, etc., may be ascertained without leaving the bridge. All these instruments are fitted with this firm's special internal illuminating devices and cards which show white degrees upon a black background, thus keeping all surplus light from the bridge and enabling a more efficient watch to be kept. Captain P. D. Murray's special nesting of three boats, one within the other, to comply with the Board of Trade regulations, also Lord Kelvin's latest Mark IV. sounding machine are also shown. The firm have supplied their various appliances to most of the leading steamship lines, dock boards, etc., their name being a guarantee of scientific excellence and practical perfection.

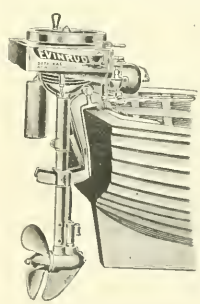
In view of the recent Board of Trade regulations the stand of the QUEEN'S STORES CO., of 41, Castle Street, is of great interest. These Turbine Ash Bags are of exceptional strength and will outlast any ash buckets or other bags. They are used entirely on the *Olympic* and by nearly all steamship companies, including the Cunard Co. This firm also supply Kola Bar Tallow for all lubricating purposes. THE BODDY LIFE-SAVING JACKETS are shown in all their styles and for all ages. These have passed all tests and been fully approved while the great feature is the fact that the wearer's head is automatically kept above water, even if he becomes unconscious. Various ash bags and other useful items for marine purposes are also displayed.

Various colonies have sections, and the collection of pottery as recently inspected by His Majesty is on view in the Palace of Applied Art, while the musical attractions are of the highest standard. Their Majesties are expected to visit the Exhibition on July 11th; this fact will, it is expected, place the last touch upon the record of success which such an undertaking undoubtedly deserves.

MARINE MOTOR NOTES.

THE motor boat is now quite a feature of the holiday weather season around the coast line and on the lakes and rivers. There is a wide choice of motors for those who meditate a departure from the oars and sails of their early essays in voyaging, to the more recent means of moving over the waters, *nec remis nec velis, autem flamma opus petere*. There is little difficulty in adapting existing sailing or rowing boats for motor drive with propellers; if it is desired to have a temporary arrangement fitted so that the structure of the boat shall not be interfered with, the driving power may be attached to the stern and overhung with the propeller driven by mitre wheel gear. There are several types of this class of motor, the illustration shows one of this type in order to give an idea of the style of motor and method of attachment to the boat.

The appeal made by the River Thames Steamboat Company for more popular support is worthy of response, as the waterway has charms of its own to please the eye of the passing traveller. The proposed addition of an oil motor boat, as an experiment which might result in the ultimate adoption of more boats similarly fitted, would doubtless be carried into effect if more generous support were forthcoming, but in the face of a loss with present traffic there is not much heartening to launch forth into more capital expenditure, when the tendency of travellers is to choose the quickest means of transit by road and rail. Possibly the appeal may reach many sympathetic minds and produce a satisfactory result. Referring to previous comments on inland waterway traffic and its economical advantages, continental nations still continue to develop this means of inter-communication. Motor boats and barges are multiplying, as also are the stretches of canals being added to and maintained. Another lighter for the Scottish Motor Shipping Co. has been launched recently to add further success to the enterprise of the Company. The Campbell oil motor promises to come into convenient service for marine work, as it is stated that recent trials have proved satisfactory, and the engine gave a good account of itself. The movements noted from time to time



The Evinrude Detachable Motor (see Marine Motor Notes).

of vessels fitted with oil motors are full of interest, indicating their progress and time underway from port to port, while the increasing number of old established shipbuilding and engineering firms who have declared themselves as in a position to undertake the fitting of oil engines goes to show the tendency of the age. Among the more recent firms to place their name on the list are Messrs. Denny & Co., Dumbarton, the pioneers of the adoption of the steam turbine. The steam turbine with revolutions transformed by gearing or electric motors to give propeller efficiency is running the oil motor somewhat close in respect to economy, and leading to close questioning regarding the costs and qualities of coal, fuel oil, and explosive engine oils.

BABCOCK AND WILCOX PATENT BOAT DAVIT GEAR.

THE accompanying illustrations are taken from photographs of a new type of boat davit, as fitted for demonstration purposes on a pontoon moored in the fitting-out basin of Messrs. William Denny & Brothers, Leven Shipyard, Dumbarton, the patentees of which are the well-known boiler and crane making firm of Messrs. Babcock & Wilcox, Ltd., Renfrew and London. The davit gear tested at Messrs. Denny's yard and herewith illustrated shows only one application of the principles embodied in this important invention. It is easily capable of development to suit the special requirements of different shipowners, and is particularly suitable for dealing with a large number of boats in the shortest possible time and for handling the much larger and heavier lifeboats which are now advocated for ocean-going passenger liners. In connection with the installation suited to deal with boats of the size presently in use, the adoption of the single wire rope fall, instead of the ordinary hemp falls, is an immense advantage, especially as concerns the re-winding of the falls. The new davit arrangement has been designed so that it may be operated either by electric power or by hand, and every action of which it is capable can be performed equally well either by manual labour or by electrical energy—thus providing for the contingency of a failure in the electrical power supply. The power control is placed in the hands of one man stationed at the motor, which is situated at the end of one davit-set and can of course be made to serve two adjacent davit-sets. By manipulating three handles he can lift a boat fully loaded from its chocks, traverse it across the ship's deck, lower it rapidly or gently over the side into the water, re-wind the empty falls on a quick speed gear and traverse back for the next boat. Should the boat, from any cause, be down by the stern or the stem, a special arrangement of the lowering gear automatically adjusts the boat to a level keel. If manual labour be employed, four men per davit are kept turning a handle constantly in one direction, while an officer manipulates the control.

The general features of the arrangement will be gathered broadly from the three illustrations given. Fig. 1 shows the main posts of the davit, vertical, with two boats housed side by side beneath it. In Fig. 2, the outboard boat is being lowered over the side, and in Fig. 3 the same boat is shown hoisted over its fellow and ready for lowering. The illustrations, as has been stated, represent the demonstration set in Messrs. Denny's basin, but it will be understood, that in an installation on board ship there would be a set at each side of the vessel facing one another in pairs. Each davit at its utmost inboard point of reach will

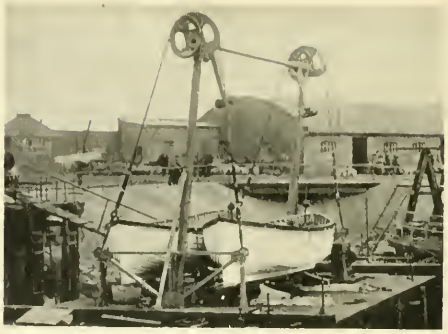


Fig. 1

be effective up to the centre line of the ship, so that a set of davits on either side of ship is capable of dealing not only with all the boats under its immediate swing, but also with those stowed under its fellow on the other side, these latter boats being simply carried across the deck inboard as far as possible by the one davit, when they are within the range of action of the davit opposite.

This very large range of action is secured by means of the derricking arms adopted, which form a distinguishing feature of the invention. These arms will be seen best in Fig. 2, in a horizontal position directly above the boat being lowered. They work in conjunction with the main posts in such a way that as the posts swing out the arms rise round their pivots. By this means not only is the range of action increased, but it is possible to carry a loaded boat across the deck at a uniform height above it. The latter feature makes the power required for traversing small, as compared with what it would be in a device in which the boat is lifted as it is being traversed and swung out. The main posts in the demonstration set have been made fairly high, in order that an inboard boat may be lifted right over an outboard boat, and if this action were not so essential, a large range of action could still be secured while decreasing the height of the main posts, by increasing the length of the derricking arms. As it is, the davit arrangement is capable of launching all the boats across the ship from either side, so that if a ship is sinking either with a bad list, or on a lee shore, the more suitable side for launching may be used. If it were permitted to stow semi-

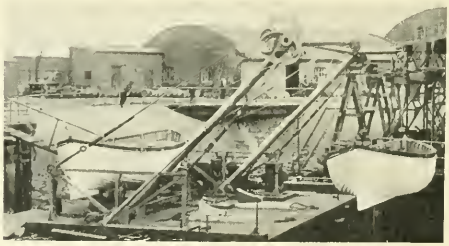


Fig. 2

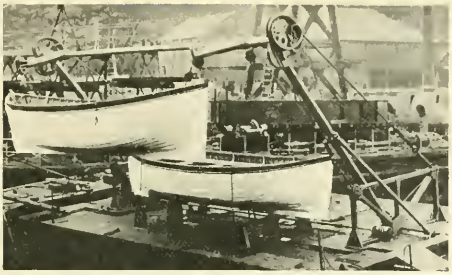


Fig. 3.

collapsible boats three in height, across the deck of a ship of 64 ft. beam, the patentees point out, that a set of such davits could launch *on either side* 18 boats capable of accommodating altogether about 850 people. Using electric power, the number of crew required to handle the 850 passengers would be 39, *i.e.*, two officers (one at each davit), two seamen in every boat, and one petty officer on deck releasing the chocks and gripes. Using manual labour, eight more men would be required at the handles, four on each side.

For use with this form of davit, a special chock has been designed, whereby a single movement of a foot-lever automatically releases the gripes and lashings and causes the chocks to fall completely away from the boat, leaving it quite free to be moved inboard or outboard. To prevent any risk of damage to the davits themselves, or to the motor, by careless operation, mechanical means are provided, which prevent over-hoisting and over-traversing. To safeguard against the former, a clutch in ordinary course slips, but if for any reason the clutch is screwed up too tightly to operate, an automatic electric cut-out comes into action, interrupting the current to the motor. In the event of over-traversing, a mechanical device automatically stops the motor. These safeguards are placed beyond the control of the operator, and render the davit as nearly "fool-proof" as possible. Reference has been made to the means provided for hoisting the empty falls quickly should this be done by hand power. In addition to this a slow gear is provided, whereby a boat fully loaded with passengers may be hoisted from the water to the deck by hand power alone.

The demonstrations with the davit arrangement, as above roughly described, were carried through on Monday, June 16th, before a large company of those technically and commercially interested, including representatives of ship-owning companies, the Board of Trade, Lloyd's Register and the Admiralty. Many of those who closely followed the various operations expressed admiration for the ingenuity and thorough practicability of the new device. The total weight of the set, which dealt with a boat 24 ft. in length, is 5¼ tons, but it was stated that when designed and constructed as a commercial article for actual service the equipment will weigh considerably less than this, especially so considering the fact that in any complete installation on board ship one electric motor will be capable of operating simultaneously several sets of davits. With electric power the time taken, in the demonstration (as recorded by the Admiralty representative), to lift the boat from the outboard chocks, traverse it 13 ft., lower and disengage it, was only 16 seconds. Re-winding the falls and traversing the davit back 23 ft. to lift a second boat took 46 seconds. Lifting the second from chocks, traversing 23 ft., lowering and releasing it took 23 seconds. Lifting the boat from the water and traversing it 36 ft. inboard took 69 seconds. By hand power, lifting and traversing the boat outward 23 ft. took 1·25 seconds, three men operating. The distance from the deck of pontoon to water surface was about 14 ft., and a variety of other operations were equally expeditious and successful.

THE CROSS OIL ENGINE.

IN the adjoining diagrams we illustrate the front and back views of one of the two-cylinder 20-h.p. marine oil engines of the semi-Diesel type, capable of operating on crude, residual or on ordinary lamp oil. This engine has been manufactured by the Westinghouse Brake Co., Ltd., of York Road, King's Cross, London, under the "Cross" patents, and is to be installed in a large sea-going pleasure cruiser and to be provided with suitable gearing to enable the engine to be controlled from the deck.

As seen from the illustrations, the Cross oil engine is of the vertical, single-acting, four-cycle type, and the whole of the moving parts are enclosed. It is constructed to use crude oils or residuals as fuel, but will work equally as well on ordinary lamp oils. The engine is of the high-speed, high-compression type, and makes use of the heat of the compression to ignite the fuel charge sprayed into the combustion chamber of the cylinder. The principles upon which it works are as follows:—

The combustion chamber, into which the fuel is sprayed, is situated immediately above the cylinder, and has screwed into it a small iron bulb, which is heated by a blow lamp before starting, and serves to ignite the charge for the first few explosions. The piston, on the first down stroke, draws air alone into the cylinder, not a mixture of air and gas or oil vapour; on the return stroke the air is compressed. Just before the piston reaches the end of the stroke, it cuts off from the combustion chamber an annular chamber or pocket. At or near the end of this stroke, and after the air pocket is closed, the oil fuel is sprayed into the highly-heated air in the combustion chamber, and ignites. When the piston has slightly moved down on its power stroke, the annular pocket or chamber, also containing heated compressed air, is uncovered, and the additional air, intermingling with the burning fluid, makes the combustion complete, and ensures economy and efficiency. Owing to this feature, the engine is exceptionally clean, and there is no smoke from the exhaust, or deposit of carbon on the valves or the cylinder. It is, therefore, possible to work for long periods without opening out the engine for cleaning purposes. Just before the end of the power stroke, the exhaust valve opens, and is kept open until the end of the following upstroke, thus allowing the products of combustion to escape through the exhaust pipe.

The valves are mechanically operated from the cam shaft, which runs at half the speed of the engine. The

speed of the engine is regulated by a governor, which varies the stroke of the feed pump, so that the amount of fuel injected at each charge is proportional to the load. The injection of fuel takes place at each power stroke, and no explosions are missed altogether: the force of the explosions is, however, varied according to the power required.

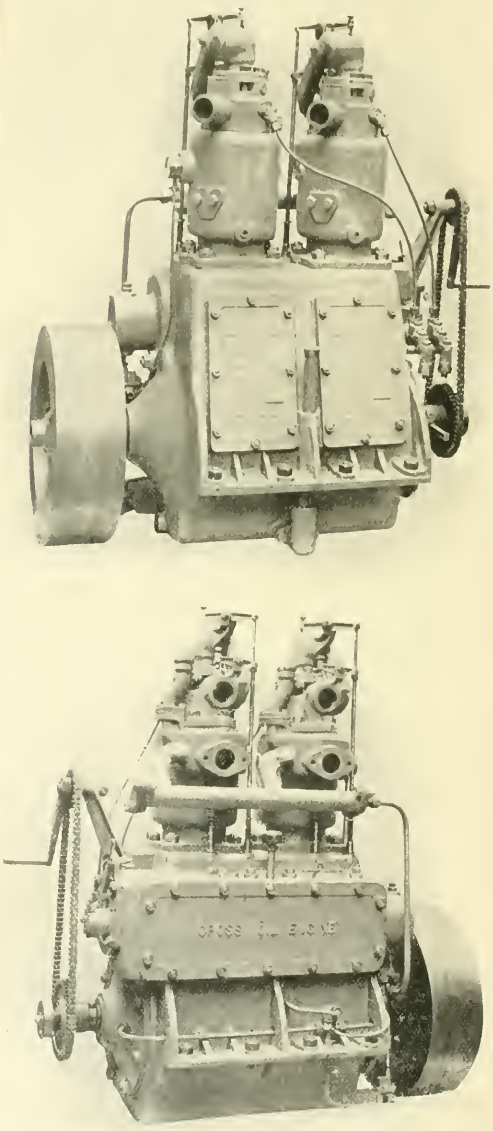
Neither carburetter nor vaporizer is required, the fuel being injected, in its liquid form, directly into the combustion chamber. Apart from the economy and efficiency of this method, the troubles inseparable from the use of vaporizers are entirely eliminated. Owing, also, to the fact that the fuel is ignited by the heat of compression, no unreliable and delicate apparatus, such as a sparking plug, is required. As air only is drawn into the cylinder, and compressed, there is no possibility of premature ignition or explosion, which, in ordinary engines, constitutes an ever present danger.

The fuel is injected in the form of a fine spray. It is not injected suddenly, but during a portion of the stroke. There is, therefore, no sudden explosion, but rather a gradual combustion of the oil, giving a moderate, but continued pressure on the piston, and avoiding a sudden and great increase of pressure at the beginning of the stroke. This method of working has the advantage that the running is smoother and that the bearings and other parts are not subjected to abnormally heavy stresses.

The engine is fitted with forced lubrication, on account of the fact that in many cases the engines are set in the boat at an angle. The forced lubrication system consists of a rotary pump fixed at the bottom of the crank chamber, and driven through a vertical shaft from the cam shaft by a pair of enclosed bevel wheels. The pump draws oil from a well formed in the base of the crank chamber, which holds sufficient lubricating oil for several days' running. The pump delivers the oil to each main bearing and the shaft is drilled so that the oil passes from the bearings into the crank shaft, and through drilled passages to the crank pin and thence to the bearing. The surplus oil from the connecting rod bearing is thrown on to the cylinder walls to lubricate the pistons. The connecting rods are hollow and the oil is fed through them from the crank pin to the gudgeon pins. A pressure gauge is connected to the delivery and should indicate about 10 lbs. pressure. If no pressure is shown on the gauge the system should be at once examined to see if the pump is getting oil or if the pipes are blocked up. To regulate the pressure of the oil in the system a spring-controlled bye-pass valve is fitted, by which the oil pressure can be readily adjusted.

To start the engine, the exhaust cam is moved, by means of the starting lever, along the cam shaft to bring a second cam into position, which, by holding the exhaust valve open for a portion of the compression stroke, reduces the compression by allowing some of the air to escape. The engine is started by heating the ignition bulb; this takes about four or five minutes. Oil is then sprayed into the combustion chamber by working the fuel pump by hand. The fly-wheel is then pulled round, and, when the engine has fired a few times, the half-compression lever is placed in the running position, and the engine runs up to its normal speed. The blow lamp may then be removed, and, as long as fuel is supplied to the engine, it will continue to run without attention.

The simplicity of this oil engine is such that it can be entirely looked after by unskilled labour, and as the action of the engine is entirely automatic, once having been started up, it requires no attention.



The Cross Marine Oil Engine.
Views of one of the two-cylinder 20 h.-p. Engines of the semi-Diesel type.

SHIPWRIGHTS' COMPANY.

THE dinner of the Shipwrights' Company was held on June 6th, when a large and representative company assembled in the Fishmongers' Hall, kindly lent by the Company of Fishmongers for the occasion. The dinner was presided over by the master, Sir Edward Clarke, at whose table were seated the Lord Mayor, Lord Inchcape, Sir George H. Reid, Vice-Admiral Farquhar, Sir Geo. C. V. Holmes, Sir Wm. G. Greene, J. Bell White, Esq., Capt. H. Acton Blake, Sir Chas. A. Parsons, Rear-Admiral H. W. Savory, Ald. Sir W. P. Treloar, Major P. MacMahon, Admiral Sir Chas. Ottley, Sir Andrew Noble, Col. Sir William H Dunn, Alderman and Sheriff Cooper, Col. Sir Philip Watts, Sir Jas. A. Ewing, E. H. Tennyson d'Eyncourt, Esq., Lord Allerton, Capt. Ward, C.M., E. Lionel Pontife, Esq., Rear-Admiral H. E. Purey Cust, C.B., Sheriff Bower, Sir J. H Biles, Sir T. Matthews, E. Hall Brown, Esq. (President Institute of Engineers and Shipbuilders in Scotland).

Sir Edward Clarke submitted the loyal toasts, and after these had been duly received and honoured, Mr. J. Bell White, Immediate Past Master, proposed the health of the Lord Mayor and Corporation of the City of London. Indicating briefly the high importance of the duties, discharged freely and without fee, and the privileges attaching to the office of the Lord Mayor, he referred to some of the excellent things accomplished at the Mansion House, which was known throughout the world for the benevolent and beneficent work with which it had been associated for many years. The Lord Mayor, Sir David Burnett, responded on behalf of the Corporation and Sheriffs of the City of London.

The toast of "The Royal and Merchant Navies" was proposed by the Master and responded to by Rear-Admiral H. W. Savory and Captain H. A. Blake. The "Worshipful Company of Shipwrights and the Master," in the hands of Sir George H. Reid, as the toast of the evening, had a warm reception, amid the plaudits of the assembly, while the Master in responding, received a hearty greeting. "The Guests," proposed by Sir Archibald Denny, of Dumbarton, was responded to by Alderman Sir W. P. Treloar.

NAVAL ENGINEERS.

THE naval engineers have propounded a scheme, under the operation of which the present shortage of engineers for the navy may be met and improved conditions brought about in the department, to the advantage of all concerned, without any increase in the annual expenditure. The scheme as portrayed in detail appears both feasible and practicable; it has been submitted for the consideration of the Admiralty. It is unfortunate that the engine department of the navy does not always receive that careful and unbiassed attention which is due to it, the traditions of a bygone age seem still to hover around the portals through which pass those who seek to serve their country in the uniform of the King's Navy. The proposed alterations are commended to the Admiralty for favourable consideration, as is the question of the Royal Naval Reserve of Marine Engineers with a high standard for admission.

IRON AND STEEL INSTITUTE.—The autumn meeting will be held in Brussels, Sept. 1st to 4th.

CORROSION OF METALS.—The work of investigating the action and probable causes to which the corrosion of metals may be attributed has been carried on under the auspices of the Institute of Metals and, in particular, experimental research dealing with the failures in condenser tubes have been conducted for about nine months. Proceedings in this direction were suspended for lack of funds to prosecute the investigations until some reliable data had been culled from the experiments, and an appeal is made for financial support, and as, obviously, funds are necessary to conduct experiments of the nature indicated, and the results will be at the service of all who are interested in getting the most efficient and durable metal for condenser tubes, no doubt the appeal will meet with the success it deserves for manufacturers and users alike.

FOREIGN AND COLONIAL NOTES.

China.

THE Chinese Government some time ago gave an order for a sea-going training ship, which has been completed by Messrs. Sir W. G. Armstrong, Whitworth and Co., Ltd. The vessel, which has been named *Chao Ho*, is to be used for officers and seamen, and has the following dimensions:—Length between perpendiculars, 100·58 m. or about 322 ft.; width, 41 ft.; depth, 23 ft. The maximum draught is 14 ft. and displacement 2·750 metric tons. The estimated speed is 22 to 24 knots per hour. The motive power adopted consists of Parsons turbines driving three propellers. There are six boilers, two being of the improved Yarrow type, the others are cylindrical with forced draught. These boilers can be heated either with coal or liquid fuel. The capacity of the bunkers is 100 metric tons of coal and 100 of liquid fuel. For training the officers and men in the handling of guns of various calibres, the *Chao Ho* carries two 125 millimetre guns and four of 101 millimetres; also two 76 millimetre and eight quick-firing guns of relatively small calibre and Maxim guns. The armament is completed by two torpedo tubes. The vessel, though intended as a training ship, has been constructed for war service if necessary.

Denmark.

The shipyard of Messrs. Burmeister & Wain, at Copenhagen, has received an order from the East Asiatic Company for seven further motor vessels, which are to be fitted with Diesel engines and to have a carrying capacity of 7,000 tons as to three and 10,000 tons as to four of them. An order for six motor vessels of about 9,000 tons carrying capacity has also been placed with the same shipyard by the Swedish Nordstiernen Steamship Company.

France.

It is intended in future not to launch the large battleships as heretofore from the ways, but to construct and fit them up completely in dock-like enclosures, into which sea water will be allowed to flow to float them. At Lorient and at Brest one of these construction pits is already in course of building. Unfavourable experience in connection with launches is the cause of this innovation.

The new submarine *Gustave Cide* was recently launched. She is provided with electrical motors and is fitted with the latest electrical innovations for carrying out the various functions of service in the most approved and reliable manner.

The cargo steamer *Russie* has been sold to Mr. Franz Krogins, shipping merchant at Helsingfors, for about 350,000 francs.

Germany.

The passenger and cargo steamer *Frederik VIII.*, built to the order of the Danish Steamship Co. at Copenhagen, has just been successfully launched at the Vulcan Shipyard at Stettin. Her dimensions are—length 158 m., beam 18·9 m., depth 12·65 m. and draught 8·38 m. when carrying 7,400 tons. The propelling power consists of two four-cylinder triple-expansion engines developing together 10,000 i.h.p., driving two propellers and giving the vessel a speed of 16·75 knots. The *Frederik VIII.* has accommodation for 218 passengers of first, 293 of second and 696 of third-class. The cabins on the third deck can be removed to give space for cargo when necessary. There are fifteen lifeboats, one motor lifeboat and eighteen collapsible lifeboats provided.

The Reichstag will shortly consider the adoption of a plan to develop aërial navigation. The chief points of the plan are the following. The sum of £2,500,000 is provided for aërial craft and landing camps, £600,000 for their working and maintenance and £300,000 for the staff of same. The plan distinguishes between airships and flying machines. Ten airships are to be constructed, eight to be always in service and two as stand-by airships; for these there will be four double revolving and two fixed sheds. The site is at Cuxhaven, where building has been commenced. There will be fifty flying machines, which will be also stationed at Cuxhaven.

The steamer *Ammon*, of the Kosmos Steamship Co., has been sold to a Belgian shipping firm at Antwerp, and has been rechristened under the name of *Flandres*.

The German Engineering Works, Ltd., at Duisburg, has received an order for two large floating cranes for the Panama Canal. It obtained this order in competition with American, Dutch and English firms for the price of 3½ million marks for both cranes, as its time of delivery was 100 days shorter than that of the other competing firms.

At the shipyard Weser at Bremen the cargo steamer *Spitzbels*, of 9,000 tons carrying capacity, was launched recently, having been built to the order of the Hansa Steamship Co., of Bremen. The dimensions of the *Spitzbels* are—length 128 m., beam 17 m., and 10 m. depth, and she will be equipped with a triple-expansion engine of 2,500 i.h.p. to give her a speed of 11½ knots. Three further cargo steamers of 12,500 tons are also in course of construction for the same company at the same shipyard.

The *Sumatra*, a cargo steamer of 12,000 tons carrying capacity, has just been successfully launched at the shipyard of the Flensburg Shipbuilding Co., where she has been built to the order of the German-Australian Steamship Co. The *Sumatra* is to be equipped with all modern improvements for long voyages and to be ready for sea as soon as possible.

Japan.

The orders for the three battleships, which are now to be built, have been placed with the Government shipyard Yokosuka and with the private shipyards of Mitsu Bishi at Nagasaki and of Kawasaki at Kobe. They are to be sister ships of the *Fuso*.

The armoured cruisers *Azuma* and *Isama* are now being employed as training ships for cadets, who have to pass a four months' training on board in practical navigation before they enter the Naval School.

Greece.

It has been decided by the Government to construct an extensive Marine Arsenal for the upkeep of the Navy in an expeditious and efficient manner and to create the possibility of constructing smaller vessels of war at home. The site is to be determined by an organizing committee.

Russia.

By order of the Czar the Port of Reval is in future to be called the "Port of the Emperor Peter the Great," and the development of this port is to be proceeded with forthwith, so that by the year 1918, not 1922, as originally intended, it will form one of the main naval bases of Russia. An English-French company has acquired a site for the establishment of a large shipyard there. It is reported that negotiations are proceeding for the purchase of battleships now in course of construction in English shipyards.

Spain.

The Dreadnought *Alfons III.* has just been successfully launched at Ferrol. Her displacement is 15,700 tons and she is to develop a speed of 19·5 knots. The armament consists of eight 30·5 cm. guns and twenty 10·2 cm. guns.

Portugal.

The programme regarding the construction of new war vessels is now to be taken in hand and is to be completed in the course of two years. The two cruisers will have a displacement of 2,500 tons and be fitted with a combination of turbine and reciprocating engines, which will impart a speed of 20 knots to the vessels. The six torpedo boat destroyers are to be of 900 tons displacement and to have a speed of 32 knots. The three submarines of 350 tons displacement are to have a speed of 14 knots on the surface and 9½ knots when submerged.

U.S.A.

The Admiralty has responded to the application of the Harvard University to train a number of students on board warships in navigation and all matters regarding the duties of sailors. It has been decided that the training is to be for several months and up to twenty students can be enrolled on the same battleship. They will be lodged together but have the same catering as the crew and wear the uniform of sailors. They have, however, to pay for the equipment and catering. A senior officer will superintend their training in gunnery, etc. This decision was enthusiastically received by the Harvard students and applications have at once been filed.

The battleship which has been voted for 1913, is to have the same displacement and be equipped with similar guns to the *Pennsylvania*, but the armour plating is to be considerably increased in thickness. It is not as yet decided whether this new vessel will be provided with Parsons or Curtis turbines.

The transport vessel to be built in 1913 is to be of 10,000 tons and will be able to take 70 officers and 1,250 men on board in addition to all necessary equipment including field and siege guns.

Canada.

One of the great events which helps to cast light upon what has been looked upon with disappointment in connection with imperial defence policy, took place at Port Arthur on June 2nd, when the largest passenger steamer built for freshwater lake traffic was launched by the Port Arthur Shipbuilding and Dry Dock Co. The vessel was built parallel to the dry dock and some 20 ft. to 30 ft. from the edge. On the launching day the dock was filled and the launching ways, having previously been laid down, all was in readiness to satisfy the eager gaze of thousands of spectators who assembled from all the surrounding country, brought by rail, motors and other vehicles to witness the ceremony of placing the *Noronic* in the water. The vessel was launched broadside on and her course from the blocks to the haven of desire was a pleasing sight to the onlookers and gratification to all concerned. Mr. Whelan is congratulated on the success which attended the arrangements—the crowning act in connection with the building of the vessel by his firm. The day of the launch was somewhat dull, and as the crowd dispersed the rain descended in torrents, drenching all who were caught in the open. A large number of the visitors came by rail from Winnipeg, a distance of over 400 miles. On Monday, May 12th, a large icebreaker was launched, also broadside on, the dimensions being 125 ft. by 28 ft. by 16 ft., with engines of 1,000 h.p. The work of the icebreakers at the end of the winter season is very useful, each cutting a channel through the ice for 36 miles to the open water, thus enabling steamers to leave about three weeks earlier than they would otherwise have been able to.

On May 22nd, the s.s. *James Carruthers*, built to the order of the St. Lawrence and Chicago Steam Navigation Co., was launched from the yard of the Collingwood Shipbuilding Co., in the Georgian Bay. The occasion was made a public half holiday in Collingwood. The *James Carruthers* has a length overall of 550 ft. and a 58 ft. beam. The largest Canadian-built vessel previously was the R. & O. steamer *Emperor*, which has a length of 525 ft. and a 56 ft. beam, with a wheat-carrying capacity of 325,000 bushels, as compared with the capacity of nearly 400,000 bushels in the new boat. This amount of wheat would require a train of cars more than 3½ miles long to carry it. The new vessel is costing in the neighbourhood of 400,000 dollars, which is approximately a dollar a bushel of its wheat-carrying capacity. Her speed will be 13½ knots per hour. From Cleveland, U.S.A., she will carry coal to Canadian ports on the Georgian Bay and Great Lakes, her return cargo being principally grain.

Austria.

On June 4th, the Cantiere S. Rocco launched the s.s. *Numidia*, a large cargo boat, to the order of Messrs. D. Tripcovich & Co., Ltd., Trieste. The new steamer is 401 ft. long, 56 ft. 6 in. beam and 29 ft. 8 in. deep. Six cargo holds with the poop 'tween deck have a deadweight capacity of about 8,250 tons altogether. The hatches will be served by thirteen steam winches and sixteen derricks, two of which have a 25-tons lifting capacity. The vessel is expected to make about 11 knots on trial. The triple-expansion machinery of 2,500 i.h.p. has been built in England. In the bridge 'tween deck will be arranged the cabins for officers and engineers, mess rooms and saloon, all with electric light and steam heating. The vessel was built under the special survey for highest class of Lloyd's Register and Austrian Veritas.

On June 19th, the Cantiere Navale Triestino (Monfalcone) launched the s.s. *Spuma*, a sister ship of the s.s. *Perla* and *Ambra*, already described in our April, 1913, issue, and delivered this year.

The current number of this journal completes the 35th annual volume. An exhaustive index will be published in the next issue.

OBITUARY.

JAS. TAYLOR.

THE death of Mr. Jas. Taylor at Ibrox, Glasgow, on May 31st has caused very great regret amid a wide circle of engineers, to whom he was well known and by whom his company was appreciated, not only in Glasgow, but in London and elsewhere. Born in Edinburgh in 1854, he was brought up and educated, then served his engineering apprenticeship near the place of his birth. After serving with Messrs. Ramage & Ferguson, Leith, he left for the west side of the land and entering the service of Messrs. D. & W. Henderson—The Anchor Line—he joined as a junior engineer in 1881, being promoted after some years of service to chief, a position he held for twelve years. He then, in 1896, joined the "Nippon Yusen Kabushiki Kaisha"—the Japan line, one of whose steamers—the *Bingo Maru*—was then being built by Messrs. Henderson, Meadow Side, Glasgow. During the Russo-Japan war the *Bingo Maru* was occupied in the carriage of goods which involved some risks, but passed successfully through them all and during the investment of Port Arthur she was within hearing of the sound of the cannon. While in this steamer, voyaging between London and Japan, Mr. Taylor became known to many of our subscribers and endeared himself to them. He was appointed to a new steamer after serving in the *Bingo Maru* for about ten years, and joined the *Atsuta Maru*. This vessel he remained in as chief engineer till he retired on account of failing health fully two years ago, since when he has been living in Glasgow. Our sympathy is extended to his family of four sons and three daughters, who mourn his loss. Only one son was present at the funeral—which took place at Craigton Cemetery on June 3rd—the other sons, who are following in the footsteps of their father, as marine engineers, were all at sea. Mr. Taylor was decorated by the Emperor of Japan with the order of the Star of the Rising Sun—a decoration he received the sanction of King Edward to wear in this country. He had also received three medals for special service in the Japan Steamship Co.

Industrial and Trade Notes.

THE CLYDE AND SCOTLAND.

(From our Own Correspondent.)

Postponed Launches.—An unusual circumstance connected with ship launching activity on the Clyde during June consisted in the postponement of the launching of two large steamers, which had been fixed for June 7th, because of highly unfavourable weather conditions. On the date mentioned and on the day following—a Sunday—a strong south-westerly gale prevailed, and at Greenock Scott's Shipbuilding and Engineering Co. postponed putting into the water the new Cunarder *Alaunia*, a vessel of 13,300 tons. At Clydebank also, Messrs. John Brown & Co. held up the launch of the twin-screw steamer *Emperor Peter the Great* of 5,750 tons. The vessels might have been floated perfectly well, but the danger was that in their helpless condition immediately after being floated they would have been driven ashore before the tugs could have got control of them. The builders carried out the pre-arranged ceremonies and left the actual launching of the vessels till the weather would be more propitious. The *Alaunia* was safely consigned to the water three days after, and *Emperor Peter the Great* on June 11th.

Ships for Russian Owners.—The launch of the twin-screw passenger steamer *Emperor Peter the Great*, above referred to, suggests a reference to the fact that at the present time a considerable amount of shipbuilding to Russian account is in the hands of builders both on the Clyde and in North-east Coast centres. The vessel launched from Clydebank is the first of four similar vessels building on the Clyde for the Russian Steam Navigation and Trading Co., Odessa; two by Messrs. John Brown & Co. and two by Messrs. William Denny & Bros., Dumbarton. On the Tyne Messrs. Swan, Hunter & Wigham Richardson, Ltd., have recently completed the reconstruction of a large sailing training vessel for the Russian Volunteer Fleet, and at the present time Sir James Laing & Sons are completing the large steamer *Novgorod* for the same proprietary, with machinery supplied by Messrs. Swan, Hunter & Wigham Richardson.

Prospective Orders.—Although the Canadian Pacific Railway Co. have not yet decided on the tenders sent in from Clyde and other firms for the construction of two new powerful turbine liners for their Atlantic service, they have given an order for two intermediate steamers to Messrs. William Denny & Bros., Dumbarton. One of the largest shipbuilding enquiries of recent date is at present occupying the attention of shipbuilding firms on both the Clyde and North-east Coast. The representative of a large American corporation—understood to be the Bethlehem Steel Corporation, the head of the American steel and armour-plate ring—is in this country issuing specifications and inviting tenders for no fewer than nine huge iron ore carriers of 15,000 tons deadweight capacity. The vessels are intended to carry a special quality of iron ore from Chili to the east coast of America through the Panama Canal for the use of the Bethlehem Corporation in making steel and armour plates. It is understood that the owners require early and simultaneous delivery of the new tonnage, so that it will be available at the opening of the great new waterway or soon thereafter.

Messrs. David & William Henderson & Co., Ltd., Meadowside Shipyard, Partick, are reported to have booked the contract to build and engine one large steamer for the Federal Steam Navigation Co., Ltd., which will be of 10,000 tons gross and a duplicate of the vessel afterwards noted as having been ordered from a Port Glasgow firm. Mr. Fred W. Henderson, of the Partick firm, has been elected by the Merchants' House of Glasgow as their representative on the Glasgow Committee of Lloyd's Register of Shipping in succession to the late Mr. Charles B. Connell.

Messrs. Harland & Wolff, Ltd., in pursuance of the scheme of rearrangement and extension to their shipbuilding establishment at Govan, have now placed with Sir William Arroll and Co., Dalmarnock Ironworks, Glasgow, the contract for erecting new workshops at the western extremity of the area eventually to be occupied by them. The site to be occupied by the new shops—which until recently has been tenanted by

Messrs. Hugh MacLean & Son, boat-builders, who have removed to the new premises in Ure Street, Govan, extend to about six acres. The building will be two storeys in height and will be constructed generally of steel and brickwork and glass. It will consist of wood-working sheds, moulding loft and other shipyard departments.

Messrs. Charles Connell & Co., shipbuilders, Scotstoun, have recently contracted to build to the order of the Anchor-Brocklebank Line two screw steamers, each 470 ft. in length, 58 ft. beam, 33 ft. depth, and of about 7,500 tons gross, intended for the Company's service between Glasgow, Liverpool and the East. The vessels are to be sister ships as far as design of hull, boilers and propellers is concerned, both being single-screw steamers, but while one is to be propelled by triple-expansion engines, the machinery of the other will consist of Parsons turbines geared down by means of Parsons reducing gear. The reciprocating engines will run at a speed of 80 revolutions per minute while the speed of the turbines in the sister ship will be 1,500 r.p.m. on the turbine shaft, reduced by gearing to 90 r.p.m. on the propeller shaft. The owners propose to run the two vessels on the same service under as nearly as possible similar conditions. As everything is being done to make them duplicates in all but actual propelling machinery, it is anticipated that their performances on service will afford valuable experience and data regarding the respective merits of the two arrangements of propelling machinery. Messrs. David Rowan & Co., engineers, Glasgow, have been given the contract for the machinery and boilers of both vessels, and they will themselves supply the boilers and condensers for both, and the reciprocating engines for one vessel. They have, however, sublet the making of the turbines and reducing gear for the other vessel to the Parsons Marine Steam Turbine Co., Wallsend-on-Tyne. It may be added that several other large liners at present on the stocks in Clyde yards are to be propelled by Parsons geared turbines, one being the large twin-screw Cunard liner *Transylvania*, of 550 ft. length and 15,000 tons gross, building by Scott's Shipbuilding and Engineering Co., Greenock, and another being a twin-screw steamer of almost the same general dimensions, building for the Anchor Line eastern service by Messrs. Alex. Stephen & Sons, Linthouse.

Messrs. William Hamilton & Co., Port Glasgow, have secured the contract to build for the Federal Steam Navigation Co., Ltd., a steamer of 10,000 tons gross, specially fitted for the meat-carrying trade.

Messrs. The Greenock and Grangemouth Dockyard Co., Greenock, have contracted with Messrs. Lane & Macandrew, London, to build—on the Isherwood longitudinal system—an oil-tank steamer 375 ft. in length by 53 ft. beam and 28 ft. depth, the engines and boilers for which will be supplied by an engineering firm in Greenock. For the Roumanian State Railways the Dockyard Co. recently launched the screw steamer *Ducegi*, of 390 ft. length, a duplicate of the *Carpate*, which was launched by the Company in February last.

Greenock Harbour Trustees, with their own workmen, under the personal supervision of Mr. Robert Crawford, C.E., engineer of the Trust, are about to thoroughly overhaul and renew the caisson at the eastern or Great Harbour entrance to the James Watt Dock. This will entail the removal of the caisson, which is 70 ft. in length, and floating it into the Garvel Graving Dock to be operated on. Before removal and floating the cement ballast will have to be broken up and removed from the interior. The Trustees are laying down temporarily a 20-h.p. motor with an air compressor and a number of pneumatic drills for carrying out the repairs. The inside of the caisson will be fitted with electric light to enable work to proceed rapidly. The work will extend over several months.

New Battleship "Ajax."—The new super-"Dreadnought" battleship *Ajax*, built and engined by Scott's Shipbuilding and Engineering Co., Ltd., Greenock, after having undergone all her official trials—gun trials included—off the South of England, returned to the Clyde on May 25th and was docked in the basin of her builders to be prepared for commissioning. The vessel was under test for practically a whole month and there was not a single hitch in the steam trials, or the gun trials, which were all gone through exactly according to time schedule. On the full-power trial of eight hours' duration she developed just over 28,000 shaft horse-power, the four turbines running at an average of 330 revolutions per minute. Six runs were made over the measured mile at Polperro, when the speed was almost exactly 21 knots. On a further trial her turbines were "opened out" and the power maintained at a considerably higher total than that above mentioned, the speed being over 22 knots. On the 30-hours' trial the turbines, working at 290 revolutions, maintained a power of 19,830 s.h.p. and the speed of the ship was considered specially satisfactory at this rate.

Messrs. The Ailsa Shipbuilding Co., Ltd., Troon, have received an order from the Laird Line, Ltd., to build and engine a single-screw cross-Channel passenger and cargo steamer.

Messrs. Hawthorns & Co., Ltd., engineers and shipbuilders, have received a contract from Messrs. Elder, Dempster and Co., Liverpool, for two twin-screw motor-driven coasting vessels for service in West African waters. The vessels are to be 135 ft. in length, 25 ft. beam and 10 ft. depth, and each will be propelled by two sets of Bolinder direct-reversible crude oil engines of 120-140 b.h.p.

THE TEES AND HARTLEPOOLS.

(*From our Own Correspondent.*)

Middlesbrough.

The Craven Steamship Co., Ltd. (Messrs. B. C. Atkinson and Sons, managers), have sold the s.s. *Wyoming*, 597 gross tons, to French buyers for about £10,500.

Messrs. Sir Raylton Dixon & Co., Ltd., Cleveland Dockyard, continue to be busy and are reported to have secured an order for a cargo steamer for Liverpool owners.

Messrs. W. Harkess & Sons, Ltd.—Nothing new is reported, but sufficient work is on hand to keep them busy throughout the year.

Messrs. Smith's Dock Co., South Bank, have a large number of steamers repairing, docking and building. They are extending their shops to enable them to manufacture practically everything for the equipment of steamers.

Messrs. Richardsons, Westgarth & Co., Ltd., are reported to have secured the contract to build several small boilers for Messrs. Smith's Dock Co.; also the machinery for a steamer building on the Tees. They are reported as likely to close down the foundry, presumably due to unsuitable soil.

Stockton and Thornaby.

Messrs. Richardson, Duck & Co. have a sufficient amount of work on hand to keep them busy for a long time to come.

Messrs. Craig, Taylor & Co. have a good amount of work on hand. They are reported as likely to secure the contract to build a cargo steamer that is in the market.

Messrs. R. Ropner & Sons have secured the contract to build a medium-sized cargo steamer for Messrs. Mordey, Williams & Co., Cardiff. They have sufficient work to keep them busy into next year.

Messrs. Blair & Co. have a large amount of work on hand, and are reported to have secured the contract to supply the machinery for the steamer to be built by Messrs. Ropner and Sons, also a set for another steamer building on the Tees.

West Hartlepool.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Harbour Dockyard, are very full up with old and new work. They have completed the s.s. *Garron Head*, which has given splendid results and are now busy on the sister ship the s.s. *Orlock Head* for the same firm.

Messrs. W. Gray & Co. have a very large job on hand in dry dock which will necessitate renewing the entire bottom, and which will keep them very busy, as all the machinery will have to come out. The vessel is a very tight fit in the dry dock, there being only 6 ins. between the rudder and the dock gates.

The Central Marine Engine Works of Messrs. W. Gray and Co., Ltd., continue busy in all departments, supplying the machinery for all the steamers building by this firm. It is reported that Mr. Henderson, works manager, is retiring after a long and honourable connection with the firm.

Hartlepool.

Messrs. Irvine's Shipbuilding and Dry Dock Co., Middleton Yard, have a large amount of new work on hand, although

no new orders are reported. It is rumoured they expect to secure the contract for a cargo steamer for Liverpool owners.

Messrs. Richardsons, Westgarth & Co., Ltd., continue to be very busy in all departments. Besides the large amount of new work on hand they have secured the contract to supply the castings for a large twin-screw set of engines for foreign account. A contract has been secured to build a turbine which will be very much larger than any as yet built by this firm, being over 12,000 kilowatts, for the Newcastle Electric Supply Co.'s station at Dunston.

THE HUMBER AND DISTRICT.

(From our Own Correspondent.)

Hull to South Africa (Prospects of a direct service).—Reference was made at the meeting of the Hull Chamber of Commerce last month to the recent visit to Hull of Mr. Chiappini, a Trade Commissioner for South Africa. During his visit the Trade Commissioner inspected several establishments and intimated that there appeared to be sufficient evidence to justify a direct line of steamships between Hull and South Africa.

Hull Trade Commissioner Tour.—Mr. Austin Wilson, who has just returned to Hull after his 12,000 miles trip to Australia, South Africa and New Zealand, as the Trade Commissioner for the Hull and Barnsley Railway and Dock Co., was recently welcomed on his return by the Chamber of Commerce. Mr. Wilson said he had been away one year and eight months, and he could tell them that the sending out of representatives to the oversea dominions was much appreciated by the people he came in contact with. During the whole of his tour in the three colonies he found that the facilities and advantages of Hull were well advertised; he scarcely picked up a newspaper during the twelve months but what he found some reference to Hull, and pressure was being brought to bear to bring about regular sailings to Hull. As the result of pressure of the Chambers of Commerce and of the Government of New Zealand, two steamers of the Clan Line, namely the *Clan McArthur* and *Clan McEwen*, had arrived within two weeks of one another, with large cargoes of wool for Bradford, and fruit, which had been sold in the Hull fruit market and realized good prices, the fruit being in excellent condition. He was looking forward to the expansion of the trade, especially after the opening of the new Joint Dock. He had made enquiries and was convinced that not less than 60,000 tons of manufactured goods went from the area served by Hull to South Africa, and if they had a regular service of steamers there was no doubt but that bulk would be increased. They had 50 per cent. of the African wool trade, but the Germans and Americans were getting into the market very rapidly. Mr. O. Sanderson expressed thanks to Mr. Austin Wilson and hoped that with the assistance they received from the railway companies and with the pressure of opinion of the merchants of Hull, they might look forward for a direct service, more or less, with South Africa before long.

Disappearance of a Chief Engineer.—The s.s. *Serbino*, Wilson Line, has just arrived at Hull, and the master reports the disappearance of the chief engineer, Mr. D. J. Proctor. The vessel was on a voyage from St. Petersburg and Mr. Proctor was at all times during the voyage in the best of spirits. He finished his watch at midnight, turned into his bunk and was seen the next morning (Saturday) at 6 a.m., after which he was not seen any more. The ship was searched from stem to stern, but no trace of him was found, the conclusion come to being that he must have fallen overboard. Mr. Proctor, who was 45 years of age, was a married man with a family and lived at 118, De-la-Pole Avenue, Hull. He joined the Wilson Line in 1895, and was held in great respect by the master, officers and crew.

Messrs. Earle's Shipbuilding and Engineering Co., Ltd., are very busy with new work, and are about launching a very large steamer, *Maroman*, for the Ellerman Lines of Liverpool and London. The firm has also two fairly large steamers on the stocks for the Wilson Line, of Hull, for their Mediterranean and Baltic trade. The repairing departments are fully employed in ship repairs, etc. The patent slips of the firm are at all times fully employed and the prospects for the Company are good.

Messrs. Cooper & Co., Ltd., Neptune Engine Works, are exceedingly busy on repair work as follows:—s.s. *Castlegarth*, general repairs; s.s. *Harefield*, in graving dock, several very large plates in the bottom renewed and other repairs; s.s. *Cho*, Russian steamer, general repairs. The firm are also securing orders for their patent propeller for home and abroad. The branch shop at Alexandra Dock is securing a number of steamers for general repairs etc., and the firm's graving dock is fully employed with coasting steamers. The s.s *Rosyth* is now receiving an extensive repair to her bottom, which is being practically renewed. The Company has had to decline work on account of the graving dock being employed, hence the work has had to leave Hull for other ports.

Messrs. Amos & Smith, Ltd., engineers and boilermakers, are very busy building new machinery and boilers for local owners and others, and have booked further orders for trawler machinery and boilers for delivery next year for Grimsby and French owners. The repairing department is kept fully employed on the different town docks. The branch works at Alexandra Dock are full up with graving-dock work and other general repairs.

Messrs. Central Dry Dock Co., Ltd., are engaged on general repairs and graving-dock work. The Company's dock is kept fully employed and they have had to secure the public graving docks at both ends of the city during the month. This firm has received many repeat orders from the steamship owners throughout the country.

Messrs. North-East Coast Engineering Works (Hull), Ltd., have had a fair amount of work on the following steamers:—s.s. *Menes*, s.s. *Euosis*, s.s. *Mureturton*, s.s. *Fredheim*, s.s. *Ardmount*, s.s. *Queen*, R.M.S.P. *Pardo* and sailing ships *Sungdal* and *Amiral Cecille*, and have effected extensive repairs in the bunkers of the s.s. *Menes*.

Messrs. Woodall & Co., engineers, are busy in all departments and have had several steamers under repair. The smith's shop is busy on forgings for the London County Council, also forgings, such as small sterns and sternposts, for several small shipyards throughout the country. Many orders for the firm's patent heavy purchase blocks have been received and a fair amount of other orders booked.

Messrs. Stewart & Craig, engineers, have had a good month on the following steamers:—s.s. *Gudrun*, very extensive repairs, new mast, new winch and repairs to bulkheads and other general work; s.s. *Amiral Courbet*, new plates on deck-houses and general work; s.s. *Rodney*, general repairs; s.s. *Fredheim*, in dry dock, several plates taken out of bottom and renewed; s.s. *Songdal* and other steamers under general repairs.

Messrs. Cochrane & Sons, shipbuilders, Selby, are still booking orders for coasters, trawlers, etc., for home and foreign owners, and have sufficient work now in hand to carry them well into next year. They have several trawlers now at Hull fitting out in the docks, the machinery being supplied by the well-known engine builders, Messrs. Amos and Smith and Messrs. Holmes, Ltd., of Hull,

H. Scarr, shipbuilder, Hessle.—This establishment is just finishing a splendid up-to-date tug, *Englishman*, for sea, and river towing for Messrs. T. Gray & Co., Hull. She seems a very useful steamer and fit to go to any part of the world. She is built to Lloyd's requirements and will be soon having her official trial trip. She has been built under the supervision of Mr. J. L. Richardson, the Company's superintendent engineer, assisted by Mr. G. Robinson, assistant engineer.

Riverside Quay is now in full swing with all the different passenger steamers coming alongside, discharging and taking cargo for the different ports on the Continent. The famous passenger steamer *Duke of Clarence* has now taken up her three weekly runs to Zeebrugge in Belgium. This seems a favourite outing for the Midland people. The Wilson Line passenger boats run from the quay on different days of the week for Norway and Sweden; the passengers from London (King's Cross) come alongside direct to steamers.

THAMES.

(From our Own Correspondent.)

Royal Mail Steamship Co.—This Company has gone to the public with an issue of £1,200,000 ordinary stock, mainly it is said, to provide capital for the purchase of the Nelson Line

of seventeen steamers and to meet other charges. The issue did not meet with quite the success anticipated, but in a matter of this kind it is always difficult to know what causes temporary fluctuations, as, generally speaking, the shipping boom seems to be still in progress. There is, however, a lull in the prices of such stocks for the moment, as the list shows, though there is no apparent lack in the earning capacity of the Company.

Thames Ironworks Co.—There have been several sensational movements in connection with the sales of this Company's property, but the position seems to be that the Canning Town site is sold to the Great Eastern Railway Co., and the plant and machinery at Greenwich to a purchaser who will reopen the works as a going concern. On an effort by Mr. Hills to induce the Poplar Borough Council to assist financially in enabling him to restart the works at Canning Town, for which he held large promises of capital, the matter was defeated. It almost looks, therefore, as if we have seen the last of shipbuilding on the river Thames unless something important occurs almost immediately to alter matters as they stand at present. In view of the sales the Company's shares had a spurt upwards on the Stock Exchange.

Motor Fire Boats.—Three motor boats for fire salvage have been recently built by Messrs. Merryweather & Sons, of Greenwich, and despatched on the deck of a steamer. They are each 50 ft. long propelled by a six-cylinder petrol engine of 80 h.p. The fire pumps, however, are driven by steam and deliver 800 gallons per minute.

Sea Training.—This important matter is brought again to the front and there is to be an autumn conference on the subject on Trafalgar Day, October 21st, while the Shipwrights' Co. will give a dinner to the members on the evening of that day. Further, it seems likely that a torpedo gunboat, lent by the Admiralty, will be stationed in the river opposite the Temple for the purpose of training lads for the sea and it would seem no better means could be afforded for securing the desired end than such a vessel stationed in such a central position would give, and we think the amenities of the river would receive also a welcome addition thereby.

Greenwich Observatory.—On the first Saturday in June the Board of Visitors made their annual inspection of this institution, and received the report of the Astronomer Royal. A noteworthy feature seems to be that wireless telegraphy is responsible for the transmission of time signals from Paris and North Germany to the Observatory daily.

SOUTH OF ENGLAND AND ISLE OF WIGHT.

(*From our Own Correspondent.*)

Southampton.—The Hamburg-America Co.'s *Imperator* anchored off Ryde on the 12th June on her maiden voyage across the Atlantic. The Mayor of Southampton and several of his colleagues paid the vessel an official visit. She will be back at Southampton on the 10th of this month.

Labour Troubles.—At the time of writing the engineers' strike, which involves a large number of men, still continues. The strike was referred to in last month's notes and has been on for a number of weeks.

Royal Mail Steam Packet Co.—This Company has disposed of their steamer *Clyde* of 5,618 gross tons, built and engined by Messrs. R. Napier & Sons, Glasgow, in 1890. The *Clyde* has been sailing out of Southampton for a number of years and was formerly well patronized on the South American service. She was recently on the Company's West Indies service and before that was attached to the Buenos Aires service for several years.

Messrs. John I. Thornycroft & Co., Ltd., Woolston Works, Southampton.—Work is still in progress on H.M. ships *Paragon*, *Porpoise*, *Unity* and *Victor*, *Daring* and *Dragon*. H.M. paddle tug *Strenuous* was delivered into service early in the current month. Work is proceeding on the Diesel-engined yacht the s.s. *St. Patrick*, a passenger and cargo steamer for Trinidad, a lightship for Trinity House, and a Canadian customs cruiser named *Margaret*. The *El Lobito*, a composite cargo vessel for Peru, has been duly delivered. During the month a number of general engineering jobs have been carried out, and the repairs department has been occupied with work on various yachts, liners, troopships and dredgers.

Messrs. J. Samuel White & Co., Ltd., East Cowes, Isle of Wight.—During the month the first of two 70 ft. twin-screw motor hospital launches, ordered by the Admiralty, has been delivered under her own power to Devonport, and the second launch is nearly ready for delivery. The 36-ft. steam pinnace for the Customs service in South America has been despatched. The Chilian destroyers *Almirante Lynch* and the *Almirante Condell* are preparing for their official trials. Two further vessels of this class are on the stocks and the shell plating of both is proceeding. H.M. torpedo-boat destroyer *Red Gauntlet* is now receiving her machinery, and the plating of her sister ship the *Rosalind* is well forward. Several steam and motor craft are running trials, and the engine works of the Company are very busy on various contracts.

Messrs. Day, Summers & Co., Ltd., Northam Ironworks, Southampton, have been extremely busy the last few weeks fitting out all the various steam yachts laid up at their yard, and fortunately this work has not been affected by the engineers' strike. By the time these notes appear the *Jason* will have sailed for Liverpool, and the *Gelert* and *Boadicea* finished. The *Vanduara* has sailed and the *Conqueror* is fitting out, after having been reclassed at Lloyd's. The *Savonara* has sailed after having obtained her classification certificate, and the only yachts now remaining on the mud are the *Schuyan* and *Matador*. Messrs. Day, Summers and Co. have never had a busier season. The *Issagai* has been put through survey and sold to foreign owners, and the *Cressida* is now undergoing survey and a considerable amount of work has been carried out on her. The instructional turret for Devonport will be shortly shipped and the machinery for the Bilbao sheers leaves the yard as soon as a steamer is fixed up to deliver it at Bilbao.

THE BRISTOL CHANNEL.

(*From our Own Correspondent.*)

Cardiff and Barry.

THE ship repairing trade of the Bristol Channel usually experiences a slack time after a bank holiday, but on this occasion during the week following Whitsuntide business recovered rather more sharply than usual, and a very satisfactory amount of general repair work was dealt with by the principal concerns. Since then a lull has been experienced, and the volume of work dealt with has dropped to the ordinary level, and although the leading concerns are comfortably situated as regards business for a little time ahead no evidence of actual pressure is shown. However, just at the time of writing the tonnage arrivals are increasing and the outlook for the ship-repairing trade is decidedly promising, for the South Wales coal trade gives every hope of being prosperous and, of course, the greater the quantity of tonnage visiting the chief ports the greater becomes the volume of repair jobs to be dealt with. A proof of the prosperity of the South Wales dry docks is shown forth by the action of discriminating investors, who have been buying South Wales dry dock shares largely of late.

Mountstuart Dry Docks, Ltd.—This flourishing Company has added another month's good work to its record, the various docks controlled by the Company having been fully occupied with vessels of very large tonnage. Heavy bottom repairs have been effected to the steamers *Knight Errant* and *Cheniston*. The *Saltburn* has had a new bow fitted, besides heavy general repairs. Considerable work has been done on the oil-tanker *Lucigen* and the steamers *Yorkmoor* and *Erlesburgh*. In addition to the above there has been the usual volume of ordinary docking and cleaning work.

The Channel, Bute and Mercantile dry docks and pontoons were fairly actively employed, and the firms of Elliot and Jeffrey, Shearman and Thomas Diamond & Co. were also satisfactorily engaged.

Hill's Dry Dock and Engineering Co. enjoyed a large share of the work of the port, and in addition were entrusted with repairs to the Admiralty fuel oil carrier *Kharki*. This old-established firm deals with a steady volume of work and its prosperous condition is due in no small degree to the energy and capability displayed by the present management.

The Graving Dock Co., at Barry, were in their usual state of activity and in addition were well booked up, and the firm

of C. H. Bailey continued extremely busy, both on jobs afloat and in the dry dock. At the latter firm's establishment in Newport a similar condition of affairs prevailed, and the combined prosperity of the two concerns places this firm in the front line of ship repairers in the Bristol Channel. The firm of Mordey, Carney & Co., of Cardiff and Newport, have recently taken a step forward and are securing a satisfactory share of the work to be distributed.

Steamer on fire at Barry.—The steamer *Broderick*, of the Blue Star Line of London, had the misfortune last week to be on fire on two separate occasions. On the first occasion the seat of fire was in the engine-room, near the oil tanks. The heat from the burning oil was so intense that the plates on the ship's side were bulged, and other extensive damage was sustained before the fire was got under. On the second occasion the fire occurred among the coal and this necessitated the pumping of much water into the ship to subdue the flames. This steamer formerly occupied a place in the fleet of the Shaw-Savill & Albion Co., under another name.

Return of Antarctic Expedition.—The auxiliary barque *Terra Nova*, which left Cardiff just three years ago with the main body and equipment of Captain Scott's expedition, returned here on the 14th June. As Cardiff had been the last home port on the departure of the expedition so it was fitly chosen as the first home port on its return to this country, and the same spirit of enthusiasm pervaded the dense crowds assembled to welcome the return of the *Terra Nova* as was manifested on the occasion of her departure three years ago. The ship presented the usual smart appearance so inseparably associated with naval vessels, and certainly showed no trace of the rigorous character of her late employment. It is understood here that the ship has been sold, and in all probability she will be handed over to her new owners at this port to be prepared for her return to her former employment as a whaler.

Welsh Dry Dock Managers Honoured.—Among the list of new magistrates appointed for Cardiff appear the names of two gentlemen who are well known in the shipbuilding and ship-repairing world, Mr. Wm. Jones, the head of the Channel Dry Docks and Pontoon Co., and Mr. Allan Johnson, manager of Hill's Dry Dock and Engineering Co. Mr. Jones is managing director of one of the greatest ship-repairing combinations in the United Kingdom, and in that capacity he controls the Channel dry docks at Cardiff, Barry, Newport and Sharpness, also the Bute Shipbuilding, Engineering and Dry Dock Co. and the Mercantile Pontoon Co., both of Cardiff. The business ability of Mr. Jones is abundantly proved by the sound financial position of the various establishments controlled by him. Mr. Allan Johnson has been for many years a most popular figure in South Wales commercial circles as general manager of Hill's Dry Dock and Engineering Co. He is a native of Stockton-on-Tees and served his apprenticeship with the firm of Palmer & Co., of Jarrow, at that time the leading concern in the country. The prosperity of Hill's Dry Dock under Mr. Johnson's management is a standing testimonial to his ability.

Visit of German Training Ship to Cardiff.—There is at present in the docks the well-known German training ship *Herzogin Sophie Charlotte* discharging a grain cargo from Chili. This ship and her sister, *Herzogin Cecille*, are owned by the North German Lloyd Co., the premier steamship line of that country, and are employed by them for the training of cadets to become officers in their steamships. The cadets on each ship number about sixty and the training they undergo in view of their prospective career is remarkable for its thorough character.

Bristol.

Some of the finest British-built marine oil motors have their home at Bristol, and one of the leading firms engaged in their manufacture, Messrs. Brazil, Straker & Co., have won for themselves and their "Djinn" motor an unassailable reputation. The position of Bristol regarding the marine motor trade is perhaps not so widely known as it deserves, so the following list of work in hand or recently completed by the above-named firm may prove interesting :

One 160-B.H.P. marine oil engine for fast Chinese passenger boat, with lighting, pumping and air compressing machinery and search light. One 160-B.H.P. marine oil engine with auxiliary machinery for foreign torpedo boat. Three 60-B.H.P. marine oil engines for shallow draught Chinese passenger boats. Two 75-B.H.P. marine oil engines for the Admiralty. Two 40-H.P. marine oil engines for the Russian Government. One 23-H.P. engine for the Chinese Customs, and a number of small engines for various parts.

The Bristol passenger steamer *Gazelle* has been fitted with a 23 B.H.P. motor and the Milford Haven ketch *Garlandstone*, fitted with a heavy duty oil engine, has been running very successfully for some time. This firm are also exhibiting their oil engines, motor cargo winches, etc., at the Dutch Shipping Exhibition

MERSEY AND MANCHESTER SHIP CANAL.

(From our Own Correspondent)

Messrs. Cammell, Laird & Co., Ltd.—A period of great activity prevails in all departments of this extensive works and yard, both in new and repair work, several new orders having recently been secured. The new Isle of Man steamer *King Orry* has run her preliminary trials on the Clyde. The *Bergensfjord* is fast nearing completion and will shortly be ready for trials. H.M.S. *Audacious* has already undergone basin trials and is expected to undergo her sea trials early next month. The steamers *Khiva* and *Khyber*, for the P. and O Company are making very rapid progress. Orders for two more vessels of the same type have recently been placed with Messrs. Cammell, Laird & Co. for the same owners. These vessels, which belong to the new "Khiva" class, are intended for the Indian trade and are 480 ft. long, 58 ft. beam and 33 ft. depth and of 9,000 tons gross, having accommodation for 150 saloon passengers. In all six similar vessels will be added to the fleet by the spring of 1915. Good progress has also been made with other work on hand, including the Canadian train ferry. An order for a large passenger and cargo steamer has been placed by Messrs. Embiricos, of Greece, and also for two high-class passenger steamers for Messrs. Mehanovich for service between Buenos Ayres and Monte Video. In the repair department the French sailing ships *Francois* and *Laemeehan* have been in hand, while the *Royal George* has now taken up her sailings between Avonmouth and Montreal. Mr. Norman M. Hunter, who for over three years has occupied the position of shipyard manager at Tranmere, has recently resigned his position to take up a position of manager of the new Elderslie shipyard of Messrs. Barclay, Curle & Co. on the Clyde.

Messrs. H. & C. Grayson.—All the yards and works of this Company are kept very busy. The steamer *Dunedin*, which recently stranded on the rocks at Rhosneigr, and was salved by the Liverpool Salvage Association, is undergoing permanent repairs. The Norwegian steamer *Falkland* is having extensive boiler renewals and repairs carried out, while the *Hektoria* is having bottom damage repairs. The steamer *Phœbus* is having collision damage repairs carried out after collision with the *Baharistan*, which latter vessel stranded on the revetment wall but was later towed to port. At Garston the Brazilian steamer *Goyaz* is undergoing extensive bottom repairs while the steamer *Eronia*, which was launched from this yard recently, is being completed.

Industrial Developments at Birkenhead. Of great importance to Birkenhead is the immense flour-milling trade located on the West float of the Birkenhead Docks. A most important addition to this trade has recently been made and is just about to be put into operation at the time of writing. The mill, which has five floors, and has a frontage to the water of 300 ft., is equipped with the latest appliances for handling the grain and extracting the dust to guard against explosion. Steam and electric machinery are installed of 2,000 h.p., which is the largest yet installed in a corn mill. The proprietors are Messrs. Joseph Rank, Ltd., of London, Barry and Hull. The new mill will compete with the American trade which, until a few years ago, held the lead in flour distribution in this country. Liverpool and Birkenhead are now the largest flour milling centres in the world, with the exception of Minneapolis.

The Canadian Northern Railway. This Company have recently purchased the steamer *St. George* from the Great

Western Railway Co for service on the Canadian seaboard. This vessel was built in 1906 by the Messrs. Cammell, Laird and Co. for the Fishguard and Rosslan service. With a length of 350 ft. she has a speed of 23 knots, being propelled with turbine machinery.

New Pilot Boat for the Mersey.—On June 17th, the *Alfred H. Read*, pilot boat arrived in the Mersey, having been built to the order of the Harbour Board by Messrs. Murdock and Murray, Ltd., of Port Glasgow. The dimensions of this interesting craft are—length 140 ft., breadth 27 ft. 6 in., and moulded depth 14 ft. The main and lower decks are continuous while long forecastle and boat decks provide promenade space. Sleeping accommodation is provided in large rooms opening off the chart house, while sleeping accommodation is provided for about thirty-six pilots in large form berth state-rooms. The apprentice pilots, engineers, stewards are berthed at aft end of lower deck. Triple expansion engines of 13½ in. by 22 in. by 36 in. cylinders with 24 in. stroke give the vessel a speed of 11½ knots, steam at 180 lbs. pressure being maintained by a Scotch boiler 14 ft. 3 in. diameter, 10 ft. 6 in. long and fitted with three Morrison furnaces. Brundrit's temperature balance and Trident firebars being fitted. Ray's reply telegraph and McNab's patent direction and revolution indicator are also fitted. The work has been superintended by Mr. Henry F. Payne and Capt. Edward Wheeler, and constructed to Lloyd's highest class.

The Wallasey Ferries.—Applications for the position of manager to the Wallasey Ferries were recently invited. No fewer than 180 applications were sent in, which the committee are now considering. Amongst the names are officials of the Port of London, R.N.R. officers, ships' masters, engineers, etc.

Manchester Ship Canal.—There will be an increase of 10 per cent. on the rates of toll and wharfage on merchandise and minerals and ship canal dues on and after July 1st. Increases will also come into operation at the docks in respect to traffic by goods trains (other than coal and coke). Similar increases will also be made on the Bridgwater Canal.

Revival of Old Shipping Line.—On June 5th, the steamer *Imperial Prince*, lying in the Senhouse Dock, Maryport, was rechristened *Myrtle Holme*. This makes an interesting revival of the Holme Line, which, six years ago, got into financial difficulties, when the fleet, consisting of six steamers and four sailing vessels, was sold. The vessel was christened by Mrs. George Brown, sister of Mr. Hine, the senior partner of Hine Bros., the late owners. Mr. Hine, who is 74 years of age, has secured this vessel as a nucleus of a new fleet.

Chadburn's (Ship) Telegraph Co., Ltd.—The 15th annual meeting of this Company was held on June 18th, Mr. Wm. Chadburn, chairman, presiding. There is a balance of £12,026 14s. from which £4,849 3s. 7d. was deducted for fees, depreciation, etc., leaving a balance of £7,177 10s., making with last year's balance a total of £11,524 14s. 4d. to be dealt with. After paying an interest of £6 per cent. on the preference shares, interest on the ordinary shares of £8 per cent. was provided for. A good amount of work is reported to be in hand.

NORTH-WEST OF ENGLAND.

(From our Own Correspondent.)

Barrow-in-Furness.—The shipbuilding trade is still very fully employed, and every department in the yard of Messrs. Vickers, Ltd., is more than fully charged with work. There is a rush on in all branches of the trade, and builders are anxious to clear out the large number of orders they have on hand so as to be ready to accept new contracts, which are on offer, alike from home and foreign Governments, as well as from owners of British shipping of all classes. Further expensive developments in Messrs. Vickers' yard have been determined upon, and these will be carried out shortly.

Admiralty Orders.—Messrs. Vickers, Ltd., very seldom give out news of new orders received. They follow the practice of keeping this class of information as quiet as possible until circumstances force the publication of details. They are, however, very busy on Admiralty work of all classes, and the orders include at present one large super-"Dreadnought," two small cruisers, a large oil tank oil-driven ship to take supplies of oil out to big and little ships at sea or in action at any point of the world, several submarines of the "E" class and others of a special experimental class which will have great capacity, high speed and great effectiveness as a weapon of warfare, together with engineering installations of great power for employment in ships of various classes, and, of course, large orders for gun mountings, projectiles, limbers and other classes of produce required to fit up naval requirements of all sorts. Efforts are being directed to complete as far as possible the super-"Dreadnought" *Delhi*, now a great way on her course, to be ready for launching in the course of a few months. When she is launched it is probable there will be two of the permanent slipways in the yard empty. The only difficulty in the way is that of getting a sufficient number of men to do the work in the time agreed upon when the contract was originally signed, but this difficulty is being gradually removed, and before long even greater progress in the work in hand will be possible.

"Reshad V."—Very considerable attention has been directed of late to the work of getting the Turkish "Dreadnought" ready for launching, and it is now probable the ship will be put in the water in the course of a couple of months. By that time the Japanese battle-cruiser will be completed for service. She has gone through her trials with the greatest satisfaction, and is now being opened out with a view to such an inspection as is possible before she is handed over to her owners. When she leaves her berth in the Buccleuch Dock it will be ready for the occupancy of the Turkish battleship, and later on also for the British battleship *Delhi*. There seems to be a greater desire to complete the *Delhi* than the *Reshad V.*, as the terms of delivery are likely to need extension, seeing that delays have occurred in her construction in consequence of labour troubles. These troubles are almost of daily occurrence in the yard, but there seems a prospect that the big difficulty with the Boilermakers' Society will not result in a strike, now that the executive of the trade society has recommended that the men shall accept the conditions offered by the masters, who are certainly anxious to avoid any stoppage of work if it can possibly be avoided. But other troubles are arising constantly with other classes of men and these have to be settled one way or another as they come on for consideration. At the moment there can be no doubt that the men are the masters of the situation, and they are getting concessions which under other circumstances would not have been possible. There is no doubt that many of these difficulties would not arise if it were not for the very congested condition of shipbuilding yards with so great an amount of work in hand, and with the certainty that in many respects builders cannot possibly complete delivery engagements at the times specified in the original contract.

Brazilian Monitors.—The first of three monitors built at Barrow for the Brazilian Government was launched on the 17th June. She is named the *Javary*, and she is intended with her two sisters, also building in the Barrow yard, to run alike up the Brazilian rivers and also along the coast. These vessels have only to go at the comparatively slow speed of 11½ knots, but they are well armed. They will each carry two 6 in. quick-firing guns, two 4·7-in. Howitzers on the upper deck aft, and six r.c. guns on the boat deck and on the forward and after navigating bridges. The launching ceremony was undertaken by Miss Lemos Basto, daughter of His Excellency Rear-Admiral Innocencio Marquis de Lemos Basto. Several high representatives of the Brazilian Government were present. The vessel was launched broadside on, the first to be dealt with in that way at the Barrow yard.

Engineering.—There is the greatest possible activity in the engineering department of the Vickers' yard, and a great army of men are employed both night and day. During last month a big delivery of guns and gun mountings was made to the Italian Government, and it is believed considerable orders are still in hand for the same owners.

Hæmatites.—The demand for hæmatite iron has fallen off considerably, and prices are lower at 80s. for mixed Bessemer numbers and 75s. warrant sellers.

Shipbuilding Material.—The demand for all classes of shipbuilding material is well maintained. Boiler plates are at £9 5s. and ship plates at £8 10s. per ton.

BELFAST.

(*From our Own Correspondent.*)

State of Trade.—The shipbuilding and engineering trades in Belfast continue brisk, and even should not another order be booked, there is enough work in hand to keep the yards in full swing for several years.

Messrs. Harland & Wolff have at present sufficient orders on their books to keep their resources taxed to the fullest extent during the next three or four years. Even their additional premises on the Clyde have not capacity enough to fully relieve the pressure of work, and the building of two vessels has been placed with Messrs. Barclay, Curle & Co. Messrs. Harland & Wolff are sparing no expense in bringing their Govan yard thoroughly up-to-date; new tools are being laid down and electric drive installed. Many improvements, entailing heavy expenditure, are also being carried out in the magnificent Queen's Island premises. A number of machine tools of various types are being put up in the turbine shop. A series of hammer-head cranes are being erected alongside the inner building berths in the south yard. These cranes will be of the fixed type—that is to say, they will not travel up and down the slips—but the radii will be such as to enable material to be lifted and deposited on any part of the entire area occupied by these berths. Then for some time past work has been proceeding on foundations of an expensive nature for a high-powered Diesel engine for generating additional electric power.

The big Australian White Star liner *Ceramic* has been dry-docked, and is once more afloat. She is receiving her finishing touches, and will leave Belfast early in July. Rapid progress is being made on the building of the 50,000-ton White Star liner *Britannic*. Now that the vessel is completely framed and partly plated one gets an idea of her enormous size. It may be said that she dwarfs the vessels building on either side of her—the Holland-American and Red Star liners—though they themselves are leviathans.

Messrs. Workman, Clark & Co. also have a big volume of work on hand, including a whole fleet of fruit steamers. They have had a continuous run of this class of vessel, extending over a period of about fifteen years, and it may well be said that what they don't know about building fruiters is scarcely worth knowing. At present they have two at the fitting-out wharves—the *Tenadores* and the *Patuca*—both of which will be ready before the July holidays. On 3rd June they launched from their south yard the new steamer *Eumaeus*, built to the order of Messrs. Alfred Holt & Co. She is a vessel 457 ft. long, with a gross tonnage of 6,700. The propelling machinery consists of triple-expansion engines, steam being supplied by two double-ended boilers working under forced draught.

LAUNCHES AND TRIAL TRIPS.

NAVAL LAUNCHES.

H.M.S. Haughty.—On May 26th, there was launched on the Clyde, for the British Admiralty, the torpedo-boat destroyer *Haughty*. The vessel is 260 ft. long, with a beam of 27 ft. 6 in. The main engines consist of Brown-Curtis turbines, driving two shafts transmitting equal powers, one propeller being fitted on each shaft. Steam is supplied by three boilers, each of which is fitted with patent feed heating and superheating arrangements, and designed for burning oil fuel exclusively.

H.M.S. Midge.—The London and Glasgow Engineering and Iron Shipbuilding Co., Ltd., Govan, have just launched H.M.S. *Midge*, torpedo-boat destroyer, the second to be launched of three destroyers in course of construction by this company for the British Navy. The dimensions of the vessel are:—260 ft. in length between perpendiculars, by 27 ft. in breadth. She is fitted with Parsons turbines to develop 25,000 s.h.p., and has water-tube oil-fired boilers of the Yarrow type, constructed by the builders. Her armament consists of three 4-in. guns and two torpedo tubes. These destroyers are of the "Acasta" class, which represents an important development in destroyer construction, and are expected to attain a very high speed.

H.M.S. Sarpedon.—On June 6th, H.M.S. *Sarpedon*, a new torpedo-boat destroyer, was successfully launched from the Wallsend shipyard of Messrs. Swan, Hunter & Wigham Richardson, Ltd. This vessel is similar to H.M.S. *Shark*, *Sparrowhawk* and *Spitfire*, which were recently built by the Wallsend firm. The propelling machinery and the boilers have been built by the Wallsend Shipway and Engineering Co., Ltd. The engines consist of two sets of Parsons impulse and reaction turbines, each driving a propeller on a separate shaft. The water-tube boilers are fitted with oil-burning apparatus.

LAUNCHES—English.

Inawilliam, Glenmona and Stanley Weyman.—On May 19th, there was launched from the yard of Messrs. Cochrane and Sons, Ltd., shipbuilders, Selby, a steel screw trawler named *Inawilliam*, the principal dimensions being 140 ft. by 24 ft. by 13 ft. 3 in. moulded. The vessel has been built to the order of Messrs. The Hecla Steam Fishing Company, Grimsby, and will be fitted with powerful triple-expansion engines by Messrs. Amos & Smith, Ltd., of Hull. Afterwards the cargo steamer *Glenmona* was launched, the principal dimensions being 112 ft. by 21 ft. 6 in. by 9 ft. 9 in. moulded. The vessel has been built to the order of Messrs. The Port St. Mary Steamship Company, Isle of Man. She will be fitted with compound surface-condensing engines by Messrs. C. D. Holmes & Co., Ltd., of Hull. On May 20th, there was launched the steel screw trawler *Stanley Weyman*, the principal dimensions being 133 ft. 4 in. by 23 ft. by 12 ft. 9 in. moulded. The vessel has been built to the order of Messrs. The Newington Steam Trawling Co., Ltd., Hull, and will be fitted with powerful triple-expansion engines by Messrs. C. D. Holmes & Co., Ltd.

Steel Screw Steamer.—On May 20th, there was launched at Workington a steel screw steamer of the following dimensions: Length, 186 ft. 4 in.; breadth, 29 ft. 3 in.; and depth, 14 ft. 7 in. The vessel, which is designed to carry about 1,100 tons deadweight, is built to the highest class at Lloyd's, and will be propelled by triple-expansion engines, having cylinders 15, 25½, and 41 in. diameter, by 30 in. stroke, steam being supplied by a cylindrical steel boiler, 14 ft. 6 in. diameter, by 10 ft. 6 in. long, working at a pressure of 160 lbs.

Kiruna.—On May 20th, this vessel was launched by Messrs. Joseph L. Thompson & Sons, Limited, of the North Sands Shipbuilding Yard, Sunderland, having been built to the order of Messrs. Rederiaktiebolaget Lulea Ofoten, of Stockholm, and is the second vessel Messrs. Thompson have constructed for this Company. The principal dimensions are:—Length, 404 ft. by breadth extreme, 54 ft. 6 in. by depth moulded, 28 ft. 6 in. The vessel has been constructed to Lloyd's highest class, and is of the shelter-deck type, specially strengthened and arranged for the iron ore trade from Norway and Sweden, the tank top having a double protection of ceiling, the ceiling being continued up the sides of the vessel. Arrangements have been made for carrying an exceptional amount of water ballast, provision being made for carrying over 2,800 tons in the cellular double bottom, fore and after peaks, and four deep tanks, ensuring good and comfortable passages when the vessel is in light trim. The engines and boilers have been constructed by Messrs. John Dickinson & Sons, Limited, of Sunderland. The vessel will be fitted with a Wilson-Pirrie steering-gear placed aft, with telemotor connection to the bridge. A complete electric lighting installation, with bells, will be fitted by Messrs. The Sunderland Forge and Engineering Company, Limited, and a Marconi wireless communication installation will be fitted. The lifeboats are of a large capacity, and will be worked by means of Welin's patent quadrant davits. No expense has been spared to ensure the comfort of the officers and crew, necessary owing to the hard and trying nature of the trade. The amidship accommodation is of a very comfortable description; the crew and firemen will be berthed in a large forecastle, with separate messrooms and washhouses. The deck machinery will be ample, there being ten steam winches and ten derricks.

Penhallow. On May 20th, Messrs. William Gray & Company, Limited, launched the handsome steel steamer *Penhallow* which they have built for Richard B. Chellew, Esq., Truro. She will take the highest class in Lloyd's Register and is of the following dimensions:—Length overall 377 ft., breadth 50 ft. 9 in., and depth 28 in. 4½ in., with long bridge, poop and topgallant forecastle. The saloon, staterooms, captain's, officers' and engineers' rooms, etc., will be fitted up in houses on the bridge deck and the crew's berths in the forecastle. The hull is built with deep frames, cellular

double bottom, and large aft and fore peak ballast tanks, eight steam winches, steam-steering gear amidships, hand-screw gear aft, patent direct steam windlass, large horizontal multitubular donkey boiler, steam ash hoist, steel grain divisions, stockless anchors, telescopic masts with fore and aft rig, boats on deck overhead, and all requirements for a first-class cargo steamer and Admiralty transport work. Triple-expansion engines are being supplied by the Central Marine Engine Works of the builders, having cylinders, 25 in., 41 in. and 68 in. diameter, with a piston stroke of 48 in. and two large steel boilers for a working pressure of 180 lbs per square inch. The ship and machinery have been built under the superintendence of Mr. John Chellow and Mr. Richard Rapson on behalf of the owners.

Loyal Prince.—On May 21st, there was launched from the yard of Messrs. Jos. T. Eltringham & Co., South Shields, an up-to date North Sea steam screw trawler, which is being built to the order of the Prince Fishing Company, Ltd., North Shields. This is the twenty ninth vessel built by Messrs. Jos. T Eltringham & Co. for the same owners.

Tregarthen.—On May 22nd, there was launched from the Shipbuilding Yard of Messrs. John Readhead & Sons, Ltd., West Docks, South Shields, a steel screw steamer, built to the order of Messrs. Edward Hain & Son, St. Ives, Cornwall, and named the *Tregarthen*. The dimensions of the vessel are : 381 ft. by 51 ft. by 27 ft. 8½ ins. She will carry a deadweight cargo of 7,850 tons on a light draught of water. She is of the improved single deck type to Lloyd's highest class and under their special survey, having poop, extra long bridge, and topgallant forecastle, with deep girder framing and cellular double bottom fore and aft, with large after peak tank for water ballast, holds clear of beams and other obstructions. The outfit of the ship is very complete for general and grain trades, with shifting boards all fore and aft and large hatchways as feeders. A full equipment of steam winches and derricks is fitted for the rapid loading and discharging of cargoes. The vessel will be fitted with triple-expansion engines, also constructed by Messrs. John Readhead & Sons, Ltd., having cylinders 26 in., 42 in., and 69 in. with 48 in. stroke, supplied with steam from two large steel boilers working at a pressure of 180 lbs. per square inch. This is the sixty-third vessel built for the above firm by Messrs. John Readhead & Sons, Ltd.

Osage.—On May 22nd, there was launched from the Hebburn shipyard of Palmers' Shipbuilding and Iron Company, Ltd., the oil tank steamer *Osage*, which has been built to the order of the Deutsch Amerikanische Petroleum Gesellschaft, of Hamburg. The vessel is over 380 ft. long, and will carry a deadweight of about 7,300 tons. She has been built on the Isherwood system of framing, will be classed 100 A1 at Lloyd's under special survey, and fitted and finished in accordance with the Beemannsordiong and See-Berufageonssenschaft and to Suez Canal requirements. The oil compartments are divided into seven pairs of tanks, two cofferdams, and pump room, the latter being placed at the fore side of bridge, with entrance from upper deck. The vessel is to be supplied by Palmers' Company with quadruple-expansion engines, steam being supplied by two single-ended boilers arranged to burn coal or oil fuel, and working at a pressure of 215 lbs. per square inch.

Hesperos.—On May 22nd, Messrs. William Doxford & Sons, Limited, launched from their Yard at Pallion, the large shelter deck steamer *Hesperos*, built to the order of Messrs. Brunsgaard, Kiösterud & Co., Drammen. The dimensions of the vessel are—Length, 402 ft., breadth, 54 ft., moulded depth, 27½ ft. Deadweight capacity 8,600 tons. During construction the vessel has been superintended by Messrs. Bushell, Nicol & Co., Newcastle, and Mr. B. Steinert on behalf of the owners. The classification is with the British Corporation and Norwegian Veritas Societies. The engines and boilers are being supplied by Messrs. Doxford.

Midland.—On May 22nd, the Northumberland Shipbuilding Company, Limited, launched from their Yard at Howden-on-Tyne a finely moulded screw steamer built to the order of Messrs. Norcure Traders, Ltd. of London (Fred Druighorn Ltd., Managers). The Vessel is 390 ft. long by 40 ft. beam by 29 ft. 4 in. deep, and has been built under special survey to the highest class at Lloyd's. She is fitted with long bridge, long poop and topgallant forecastle, the accommodation which is very ample being placed in steel houses on the bridge deck. Special attention has been paid to the loading and discharging gear, and a complete outfit for the rapid handling of cargo arranged for, consisting of eleven steam winches by Messrs Clarke, Chapman & Co., Ltd., Gateshead on Tyne, a large number of cargo derricks, and steam windlass by Messrs. Emerson, Walker & Thompson Bros., Ltd. She is fitted with the usual water ballast arrangements for light passages. The propelling machinery will be supplied by Messrs. Richardsons, Westgarth & Co., Limited, Sunderland, consisting of engines with cylinder 25 in., 41 in., 69 in. by 48 in. stroke, with three large steel boilers working at 180 lbs. pressure. The steamer will carry about 7,700 tons on a light draught and steam about ten knots loaded at sea. During construction the vessel has been superintended by Messrs. Flannery, Baggallay & Johnson, Ltd. of London, on behalf of the owners.

San Silvestre.—On May 23rd, there was launched at Wallsend-on-Tyne by Messrs. Swan, Hunter and Wigham Richardson the steamer *San Silvestre*. The vessel, which is designed for carrying petroleum in bulk, is one of several steamers which the Wallsend firm have in hand for the Eagle Oil Transport Company, Ltd., of London. The *San Silvestre* has been constructed on the Isherwood system of longitudinal framing under the supervision of Messrs. Jacobs and Barringer, of London, the owners' consulting naval architects and engineers. The vessel is 432 ft. long, 54½ ft. broad, and has a deadweight capacity of about 9,300 tons. The quadruple-expansion direct acting engines will be placed in the after end of the vessel, and, together with the boilers, have been built by the Wallsend Slipway and Engineering Company. The boilers will be fitted with forced draught, and will also be adapted for burning liquid fuel under pressure. The range of oil-tight holds is isolated by a cofferdam at each end. The space between the forward cofferdam and the fore peak will be used for general cargo. The oil holds will be fitted with steam piping for heating the oil when necessary.

Floridian.—On May 31st, the s.s. *Floridian* was successfully launched from the Shipyard of Messrs. Short Brothers, Limited, Pallion, Sunderland. She has been built on the Isherwood patent system to the order of the Leyland Line of Liverpool (Messrs. Frederick Leyland & Co., Limited), her dimensions being, length, 399 ft. 6 in., beam, 51 ft. 6in. and depth moulded, 29 ft. 11 in., and is designed to carry a cargo of 7,700 tons on a moderate draught with fine coefficient. The vessel, which will take Lloyd's highest class, is double decked with poop and bridge and topgallant forecastle. A large quantity of water ballast is provided in the double bottom, which is deepened at the after end and in fore and after peak tanks. Five large cargo hatches are fitted, served by ten derricks stepped on tables at masts and swung from cross-trees above. Nine steam winches, steam windlass and steam steering in engine room, driven from teak wheelhouse and connected by chains and rods to double armed quadrant on rudder head, are supplied, taking steam from the main boilers. Right and left-hand screw gear and rudder brake are also supplied. The saloon neatly panelled in polished oak, is situated in a large steel house on fore end of bridge deck with rooms for officers and stewards, captain's room and chartroom are in house above. The engineers and apprentices are berthed in houses abreast of casing on bridge deck and the crew in the poop. The propelling machinery will be installed by Messrs. George Clark, Limited, of Sunderland, and consists of triple-expansion engines with cylinders 26, 42 and 70 inches diameter and 46 inches stroke, taking steam from three large boilers of 180 lbs. pressure. While under construction the hull and machinery have been under the supervision of Captain Fry, Mr. H. Scott and Mr. Johnstone Hughes, of Liverpool.

Sudmark.—On June 3rd, Messrs. Wm. Doxford & Sons, Ltd., launched from their yard at Pallion, Sunderland, the s.s. *Sudmark*, built to the order of Messrs. The Hamburg-Amerika Line, Hamburg. The dimensions of the vessel are, length, 434 ft., breadth, 54 ft., moulded depth, 29ft. Deadweight capacity, 8,850 tons. Messrs. Doxford are supplying the engines and boilers ; and have recently built a sister ship for the same owners. Classification is with Lloyd's, in their 100 A1 class. During construction the vessel has been superintended, on behalf of the owners, by Mr. C. Hatje and Mr. F. Waak.

El Toro.—On June 3rd, the steamer *El Toro*, which is being constructed by Messrs. Swan, Hunter & Wigham Richardson, Ltd., at their Neptune Works, Newcastle-on-

Tyne, to the order of the Lobitos Oil Fields, Ltd., of London, was successfully launched. The steamer is an oil-carrying tank vessel of the latest type, and is fitted with all the most modern improvements. She is 420 ft. in length, by 54½ ft. beam, and will have the highest class in Lloyd's Register. She is intended to carry over 9,000 tons of oil in twenty oil holds, arranged two abreast, with two cofferdams and two pump rooms, and in addition she has a cargo hold forward, together with a deep tank for water ballast, besides having both peaks arranged to carry water ballast. The propelling machinery, fitted aft, will consist of a set of triple-expansion engines supplied with steam from three large boilers, arranged to burn coal or to use oil fuel. Both engines and boilers are being constructed by Messrs. Swan, Hunter & Wigham Richardson, Ltd., at their Neptune Works.

Steel Screw Steamer.—On June 4th, Messrs. Ropner & Sons, Ltd., Stockton-on-Tees, launched from their yard a steel screw steamer of the following dimensions, *viz.* :—Length, 403 ft. 6 in., breadth extreme, 50 ft. 6 in., depth moulded, 30 ft. 6 in. The vessel is built to the highest class at Lloyd's, and is of the two deck rule, and fitted with nine feet 'tween decks. She will have poop, bridge and topgallant forecastle, the framing being of bulb angle. The saloon and cabin for the captain, and officers and engineers will be fitted up in iron houses on the bridge deck. The crew being berthed in the poop. She will be fitted with water ballast tanks on the cellular principle fore and aft. The fore and after peaks also being fitted as water ballast tanks. The vessel has a direct steam quick warping windlass, stockless anchors, steam steering gear amidships, with powerful screw gear aft, and is fitted with ten large steam winches, all working at 100 lbs. steam pressure, exhausting into a separate winch condenser; an electric light installation is fitted throughout the ship. The vessel is fitted with double derricks to each hatch and all her appliances for loading and discharging cargoes are very complete, including a fifteen ton derrick working out either the fore main or after main holds. Triple-expansion engines will be supplied by Messrs. Blair & Co., Ltd. of Stockton-on-Tees, having cylinders 26 in., 43 in., 71 in. by 48 in. stroke, steam being supplied by three single-ended boilers, each 15 ft. by 11 ft. 3 in. with a working pressure of 180 lbs., and fitted with evaporator, etc.

Atherstone.—On June 5th, Messrs. Craig, Taylor & Co., Ltd., launched from their Thornaby Shipbuilding Yard, Thornaby-on-Tees, a fine and handsomely modelled single deck screw steamer of the following dimensions :—382 ft. by 51 ft. 4½ in. by 26 ft. 6 in. moulded; She is built of steel to the highest class in Lloyd's Registry, under special survey, and has several important additions to the Owners' special requirements. She has poop, long bridge and forecastle combined; very large water ballast capacity in double bottom fore and aft and in peaks; she is fully equipped with all the latest and best types of special machinery for the general equipment usual for this class of steamer, and for rapid loading and discharging. The steamer is specially adapted for the Eastern, Gulf, Plate and general trades, and has very large cubic capacity. She is fitted throughout with shifting boards, etc. for the carriage of grain. Special attention has been given to the accommodation for the master, officers, and crew, who are all provided with very superior rooms, and comfortable quarters, the master, officers and engineers, being on bridge deck amidships, and the crew in the poop. Her engines have been constructed by Messrs. Blair & Co., Ltd., Stockton, the cylinders being 26 in., 42½ in., 69½ in. by 45 in., with two large steel boilers working at 180 lbs. pressure. An additional boiler being supplied for cargo and general purposes by Messrs. Riley Bros., Ltd., Stockton. The vessel has been built to the order of Messrs. Charles Radcliffe & Co., Cardiff, and a duplicate steamer is also in course of construction by the same builders, for the same firm. The steamer has been built under the supervision of Mr. Charles Jones, consulting engineer, of Cardiff, assisted by Mr. J. W. Henry and Mr. W. T. James. Messrs. Wailes, Dove & Co.'s Patent "Bitumastic" Enamel has been applied throughout the bunkers and boiler-room tank, and their Patent "Bitumastic" Covering to the tank top in boiler-room.

Ocean Transport.—On June 5th, Messrs. Irvines Shipbuilding & Dry Docks Co., Ltd., launched from their Middleton Shipyard, West Hartlepool, the steel screw steamer *Ocean Transport*, built to the order of Messrs. Furness Withy & Co., Ltd. for Messrs. The Empire Transport Co., Ltd. (Messrs. Houlder Brothers & Co., Ltd., Managers), London. The dimensions of the vessel are 400 ft. in length by 52 ft. beam extreme by 29 ft. 6 in. depth moulded, carrying over 8600 tons on a moderate draught. She is built to British Corporation Classification, having a single deck of steel, with poop, bridge and forecastle, and water ballast is carried in cellular double bottom and fore and after peaks. The vessel is constructed with deep frames and longitudinal stringers, and is divided into seven watertight compartments by means of six transverse bulkheads. Wood grain divisions are fitted throughout the holds according to the latest Board of Trade regulations. Four large hatches are provided, and a cross bunker hatch, together with all the latest facilities for the rapid loading and discharging of cargo, including 10 steam winches exhausting back into the stokehold, and 12 derricks. A powerful quick-warping steam windlass is fitted forward, with steam-steering gear amidships and hand-gear aft. The captain, officers and engineers will be berthed in large houses amidships, and the crew and firemen in the forecastle. The lighting, heating and sanitary arrangements have received special attention, the most improved methods being adopted throughout. The machinery, which has been constructed by Richardsons, Westgarth & Co., Ltd., Hartlepool, consists of a set of "Richardsons'" standard triple-expansion engines, having cylinders 25 in., 40 in. and 68 in. by 48 in., with three large boilers working under natural draught at a pressure of 180 lbs. per square inch. The condenser is of the "Contrago" type with Temperature Regulator and the engine-room auxiliaries include a Cascade feed water heater and filter, a Morison evaporator, large ballast donkey and harbour feed pump, etc.

Photinia.—On June 5th, Messrs. Wm. Pickersgill & Sons, Ltd., launched from their yard at Southwick, Sunderland, a large single-deck screw steamer, of the long bridge type, built to the order of the "Stag" Line. Her dimensions are 395 ft. by 51 ft. 10 in. by 29 ft. 6 in. and she will carry 8,200 tons. She is to be thoroughly equipped as a first-class up-to-date cargo vessel to take Lloyd's highest class having steel centre bulkhead and to pass the Grain Cargoes Act. After the launch the vessel proceeded to Messrs. Geo. Clark, Ltd., for her engines. During construction she has been under the supervision of Mr. Milne.

San Gregario.—On June 6th, the *San Gregario*, an oil-tank steamer of 15,700 tons deadweight capacity, was launched from the Wallsend shipyard of Messrs. Swan, Hunter and Wigham Richardson. The vessel, which is built on the Isherwood system and is fitted with quadruple-expansion engines and boilers designed to use Mexican oil fuel, is the third which has been launched for the same owners within the past three weeks and the sixth of the fleet of nineteen ships intended for the distribution of the Mexican oil fuel and other petroleum products of the Mexican Eagle Oil Company. The sister ship *San Fraterno* has just returned from Mexico with a full cargo, having made the round trip at an average speed exceeding 11 knots on a consumption of only 38 tons of Mexican oil fuel per day, three only of the four oil-fired boilers being employed. The outward voyage was completed two days earlier than was anticipated, and the homeward trip one day. Messrs. Wailes, Dove & Co.'s Patent "Bitumastic" Solution was applied throughout the cellular double bottom and their "Bitumastic" Covering on the tank top.

Anthony Hope.—On June 7th, there was launched from the yard of Messrs. Cochrane & Son, Ltd., Shipbuilders, Selby, a steel screw trawler, the principal dimensions being, 133 ft. 4 in. by 23 ft. by 12 ft. 9 in. moulded. The vessel has been built to the order of Messrs. The Newington Steam Trawling Co., Ltd., Hull, and will be fitted with powerful triple-expansion engines by Messrs. C. D. Holmes & Co., Ltd., of Hull.

Lucellum.—On June 14th, there was launched from the high yard of Sir James Laing & Sons, Ltd., the oil-carrying steamer *Lucellum*, which has been built to the order of Messrs. H. E. Moss & Co., of Liverpool, London and Newcastle-on-Tyne, and transferred by them to the Lucellum Steamship Co., of Liverpool, of which they are the managing owners. The principal dimensions of the vessel are as follows :—380 ft. between perpendiculars, 50 ft. 6 in. breadth moulded, 31 ft. depth moulded to upper deck. The vessel has a long poop deck, covering the machinery space, and the oil fuel

bunkers, bridge deck amidships, also topgallant forecastle, and has been designed to carry a deadweight cargo of 7,000 tons. All the oil tanks, which number sixteen, have been fitted out with coils of steam pipes for warming the cargo. Two large horizontal duplex brass-fitted oil pumps, each capable of discharging 150 tons per hour, are fitted in the pump-room, and in addition the vessel is equipped with oil fuel, ballast, and feed donkey pumps. The bunkers are specially large, and are adapted for both coal and oil. The accommodation for officers, engineers and crew is well planned to give large and airy rooms for each. The dining saloon is handsomely panelled out in mahogany, with panelled ceiling, and floor laid in parquetry with carpet runners. The vessel will be lighted throughout with electricity by Messrs. Boothroyd & Co., of Liverpool, and provision has been made for an installation of wireless telegraphy. There are three powerful steam winches for warping the vessel, and steam and hand-steering gear aft, controlled from upper bridge amidships. The propelling machinery consists of one set of triple-expansion surface-condensing engines, having cylinders 26 in., 44 in. and 72 in., with a stroke of 48 in., steam being supplied from two multitubular boilers, 17 ft. 3 in. by 12 ft. long, working under forced draught, all by Messrs. George Clark, Ltd., Sunderland. Oil fuel apparatus by Messrs. The Wallsend Slipway and Engineering Co. is fitted to the main boilers, also to the large auxiliary boiler which is fitted in a deck house in the casing. During construction, the vessel has been under the inspection of Messrs. Atkinson, Young and Robson, of Liverpool and Newcastle, and the surveyors of Lloyd's Register for their special survey and highest class, also for the Bureau Veritas classification, as well as the Board of Trade for Suez Canal regulations and Factory Act requirements. The above vessel is a sister ship of the oil-tanker *Lucellum*, the launch and trial trip of which we reported in our issues of December, 1912, and January, 1913, respectively, and which has since been sold.

Waldorf and Glatian.—On June 18th, there was launched from the yard of Messrs. Cochrane & Sons, Ltd., shipbuilders, Selby, the screw trawler *Waldorf*, the principal dimensions being 133 ft. 4 in. by 23 ft. by 13 ft. 1 in. moulded. The vessel has been built to the order of Messrs. Letton, Grant and Windeatt, of Grimsby, and will be fitted with powerful triple-expansion engines by Messrs. C. D. Holmes & Co., Ltd., Hull. Afterwards another steel screw trawler *Glatian* was launched, the principal dimensions being 120 ft. by 21 ft. 6 in. by 12 ft. 3 in. moulded. The vessel has been built to the order of Messrs. The Great Central Co-operative Engineering and Ship Repairing Co., Ltd., Grimsby, and will be fitted with powerful triple-expansion engines by themselves.

Moto.—On June 18th, there was launched from the shipbuilding and repairing establishment of Messrs. S. P. Austin and Son, Ltd., Wear Dock Yard, Sunderland, the steel steam collier *Moto*, of about 2,750 tons deadweight, which has been built to the order of Messrs. R. S. Gardiner and Joseph Reay, of the Pelton Steamship Co., Ltd., Newcastle and London. She will be classed 100 A1 under Lloyd's Special Survey, has large hatchways specially adapted for the owners' coal trade and exceptionally large water ballast capacity. The accommodation for the captain is fitted in the bridge, engineers and officers in houses on bridge, and crew in forecastle. The machinery will be supplied by Messrs. George Clark, Ltd., of Sunderland. The vessel has been superintended during construction by Mr. A. Daniels on behalf of the owners.

Kathlamba.—On June 18th, Messrs. William Gray and Co., Ltd., launched the handsome steel screw steamer *Kathlamba*, which they have built for the Bucknall Line Section of the Ellerman Lines, Ltd., Liverpool. The vessel is built of the following dimensions:—Length overall, 447 ft.; breadth, 54 ft. 8 in., and depth, 33 ft. 10 in., and will be assigned to the highest class in Lloyd's Register. She is a handsomely modelled vessel, built with a cruiser stern and will be equipped for wireless telegraphy. She has two decks laid, long poop, bridge and topgallant forecastle and very tasteful cabin accommodation in houses on the bridge deck for passengers; captain, officers and engineers and the crew's accommodation is in a house at the fore end of poop. An electric lighting installation is fitted throughout the vessel. The cellular double bottom extends from stem to stern and a deep tank hold compartment is fitted for water ballast abaft the engine-room, giving a total capacity for water ballast of about 2,250 tons. The whole of the equipment is of the most approved description including sanitary tanks, fresh water distiller, steam windlass, steam steering gear, fourteen derricks and heavy derrick to lift 35 tons, thirteen steam winches, with return exhaust to winch condenser of the "Cmew" type. Triple-expansion engines are being supplied from the Central Marine Engine Works of the builders having cylinders 25¾ in., 44½ in. and 77 in. diameter, with a piston stroke of 51 in., and three large steel boilers, adapted to work at a pressure of 220 lbs. per square inch, and fitted with Howden's system of forced draught. The engines are fitted with a "Cmew" main condenser, of the self-draining type, a pair of independent feed pumps and direct contact feed heater, which, in conjunction with the builder's special arrangement of boiler feed water heating by means of exhaust steam, ensures the boilers being fed with water at a high temperature. The engine-room auxiliaries include an evaporator, feed and ballast pumps, auxiliary condenser, etc., all of the "Cmew" type. The ship and machinery have been built under the superintendence of Mr. Alexander Dalrymple, assisted by Mr. Robert Sharp, on behalf of the owners, and the ceremony of naming the steamer *Kathlamba* was gracefully performed by Miss Dorothy Pyman, of Seaton Carew, Mr. H. Rennie, superintendent of the Bucknall Line, was also present.

LAUNCHES—Scotch.

Matsura Maru—On May 17th, Messrs. Russell & Company, Port Glasgow, launched the *Matsura Maru*, which they have built to the order of the Mitsu Bishi Goshi Kaisha, Tokio. The vessel has been constructed to the highest class at Lloyd's, and is 331 feet in length, 49 feet in breadth, and 24 feet 3½ inches in depth, with a dead-weight carrying capacity of 5,500 tons. She has been built under the superintendence of Messrs. A. R. Brown, M'Farlane & Company, Glasgow, the owners' representatives in this country. The machinery will be supplied by the Clyde Ship-building and Engineering Company.

Alfred H. Read.—On May 17th, Messrs. Murdoch & Murray, Port Glasgow, launched the pilot steamer *Alfred H. Read* for the Mersey Dock and Harbours Board. The vessel is a great advance on the four pilot steamers built some years ago by the same firm for the Mersey. Powerful triple-expansion engines will be supplied by Messrs. Ross & Duncan, Glasgow. During construction the ship and machinery were superintended by Mr. Payne and Captain Wheeler.

Innisinver.—On May 20th, Messrs. A. Jeffrey & Co., Alloa, launched the *Innisinver*, built for the Coasting Motor Shipping Company, Glasgow. The vessel is 73 feet 6 inches in length, 18 feet 9 inches in breadth, and 9 feet 6 inches in depth, and has a carrying capacity of 170 tons. She will be supplied with a Tuxham crude-oil engine developing 86 b.h.p. on a consumption of 4½ gallons per hour.

Impoco.—On May 20th, The Greenock and Grangemouth Dockyard Company, Grangemouth, launched the s.s. *Impoco*, built to the order of the Deutsch Amerikanische Petroleum Gesellschaft, Hamburg. She is 230 feet long, 43 feet beam and 21 feet moulded depth, is intended for the carriage on the Canadian lakes of petroleum in bulk, and designed for passage through the Welland Canal. She carries a dead-weight of about 3,000 tons on a draught of 18 feet, and has all the necessary sub-division into a large number of oil-tight spaces for the carriage of volatile oils. Pumps of large power, with complete installation of pipe line and valves, are provided for dealing with oil cargoes. The vessel is designed so that when occasion requires she can carry liquid oil fuel instead of coal. Triple-expansion engines, with two large boilers, will be supplied by Messrs. Cooper and Greig, Dundee.

Gelria.—On May 20th, Messrs. Alex. Stephen & Sons, Ltd., Linthouse, launched the large twin-screw steamer *Gelria*, for the Koninklyke Hollandsche Lloyd, of Amsterdam. Her dimensions are:—Length 560 feet, breadth 66 feet, and depth 39 feet, with a gross tonnage of about 14,200. The vessel has been designed exclusively for the carriage of passengers and mails, and with her sister vessel the *Tubantia* also building at Linthouse, is intended to augment the new service of "de luxe" passenger steamers for the Company's passenger and mail service between Europe and South America, inaugurated by the fine steamers "*Frisia*," *Hol-*

landia and *Zeelandia*, the two latter also built at Linthouse. The passenger accommodation occupies five decks, allocated for 250 first class, 230 intermediate class, 140 special third class, 900 third class. The first class are situated amidships on the upper, shelter and bridge decks, and comprise special suites containing sitting room, bedrooms, lavatory and bathroom. A large number of Cabin de luxe (with single berth-room extension) and private lavatory and bathroom, also one berth, two berth, and three berth rooms—several of the latter having their own lavatory and bathroom. A Children's Room is provided in the best part of the ship and the Gymnasium is situated on the Boat Deck. The Intermediate Class accommodation is situated immediately abaft the first class and the third class passengers, accommodation is situated forward on two decks, with lavatories, bathrooms, sitting rooms, pantry, bar and sheltered deck space.

Amongst the offices for the convenience of the passengers may be mentioned the Gentlemen's hairdressing saloon, Ladies' hairdressing saloon, complete with electric vibro massagers, hair curlers, patent chairs, etc., close to which is the Emporium where can be bought minor necessities and articles easily forgotten when packing. Enquiry Bureau and Office, Telephone Exchange, Purser's Office and Strong Room. Photographic room for changing plates, and Dark Room for developing; Head Doctor's Cabin and Dispensary for first class, Assistant Doctor's cabin and Pharmacy for general use; also Operating Room. A Laundry fitted with electrically driven washers and ironers and patent drying room. Baggage room with direct access from passengers' quarters. Printing Room. Filter Room with Buhring Sterilizing process for drinking and washing water. Hospitals, with special infectious Hospitals aft separate from the accommodation proper.

The culinary department is complete with separate galleys and pantries for their various classes, all fitted with the latest appliances, including steam and electrically operated ovens, stockpots, coffee urns, egg boilers, dough mixers, potato peelers, dish washers, ice-making machines, etc. Officers and engineers are berthed in deckhouses on the boat deck convenient to the navigating bridge and engine room and the crew forward. The special fitments for the navigation and safety of the ship are numerous and up-to-date, including Marconi Wireless Telegraphy. Clayton Fire Extinguishing and Disinfecting installation. Stone-Lloyd Hydraulic system for closing all W.T. doors from the navigating bridge. Submarine signalling apparatus. The Ralston G.M. and trim meter for ensuring the stability and regulating the trim of the vessel. Electric searchlight and electric indicators from the rudder, log, refrigerating chambers, etc. Telegraphs and loud-speaking telephones to all parts of the ship. Double installation of steam steering gear. Oil motor driven electric installation on boat deck for lighting ship when main dynamos are not in use. Ample boat accommodation for everyone, each boat being fitted with separate patent lowering and disengaging gear. The engines, also constructed by Messrs. Stephen, are of the quadruple-expansion type, supplied with steam from three double-ended and six single-ended boilers fitted with Howden's Forced Draught, and amongst the special fittings may be mentioned a Stone's Ash Ejector for discharging ashes without bringing them up through the passenger decks. Messrs. Matthew Keenan & Co., Ltd., have the contract to cover the boilers and steam-pipes throughout the vessel.

Balari.—On May 22nd, Wm. Simons & Co. launched the *Balari* to the order of the Commissioners for the Port of Calcutta, which is the largest dredger yet built on the Clyde. The hull of the vessel is constructed with a central bow well through which the suction pipe is operated. Owing to the great volume of drift sand and silt of very light specific gravity deposited in the Hooghly during the flood season special consideration had to be given towards providing appliances which would efficiently retain this light material, and prevent a large percentage of loss in the overflow from the hopper when dredging operations were in progress. The dredger has accordingly been fitted with "Simons" patent sand trapping arrangement. It is commmon knowledge that Harbour Authorities using suction hopper dredgers for dredging sand bars in rivers and harbours have for many years been endeavouring to find some means to accelerate the depositing of the dredged material in the hoppers, and thereby reduce the loss in overflow which is always considerable and frequently becomes excessive after the hopper gets more than half full. The "Simons" patent sand trapping arrangement is most effective in its action in reducing the loss in overflow to a minimum, and has been fitted by the builders in other dredgers of their construction, with eminently successful results. To assist in keeping a large vessel of this kind at her work when exposed to the strong currents of the River Hooghly the dredger has also been fitted with "Simons" patent arrangement of hydraulic steering jets fitted at bow of vessel. This dredger, which is 333 feet in length by 54 feet 6 inches by 22 feet 3 inches, has a hopper capacity of 71,600 cubic feet, and has been specially designed for the unique character of the dredging to be done on the Hooghly. The hull and machinery are constructed to Lloyd's highest class. The main deck is of steel, sheathed with teak. Steam and hand steering gear is fitted, and a very complete installation of electric lighting is provided, included two searchlights. The propelling and pumping engines are placed in two independent compartments. The propelling power is supplied by two sets of triple-expansion surface condensing engines, embodying all the latest improvements in marine engine practice, including steam and hydraulic reversing gear, steam turning gear, independent circulating pumps, automatic feed pumps, feed heaters and filters, large evaporators for feed water make up, and a complete outfit of auxiliary feed and bilge pumps. Steam is generated by four large single-ended horizontal multitubular boilers, constructed to Lloyd's rules for a working pressure of 180 lbs. These boilers are designed with ample surface for burning Bengal coal under forced draught. An ash ejector is fitted in the stokehold. The pumping outfit, placed forward of the hopper in an independent engine room, consists of one set of triple-expansion engines, with independent condensing plant and circulating pumps, complete with all modern fittings. The pump engines are coupled direct to a centrifugal sand pump specially designed to raise and discharge about 5,000 tons of sand and silt per hour. The pump is connected to a suction pipe, placed in a well at fore end of the vessel, being fitted at upper end with a massive swivel bend, which serves as a trunnion or hinge upon which the pipe is free to move vertically. The suction end of the pipe is fitted with a specially designed nozzle to suit the character of the material to be dredged while a grid is also fitted to the nozzle to exclude material which might choke or damage the pump. The suction pipe is controlled by a steam winch placed on deck. The discharge pipe from the sand pump is carried aft of the hopper. One of the outstanding features of the deck equipment of this dredger is the extensive and powerful installation of mooring winches to regulate the movements in the rapid currents of the River Hooghly.

The bow winch has four large independent wire rope drums for working long lengths of heavy steel wire rope. The winch is driven by a vertical high pressure engine, the gearing throughout being of steel. In addition at bow a very massive windlass is fitted having four independent cable holders and two warping ends. At the stern a large windlass is fitted having two independent cable holders and two warping ends of extra large dimensions. A large workshop is fitted under deck so that all general repairs may be effected on board. The outfit of machine tools is very complete, and consists of lathes, shaping machine, radial drill, etc., also smith's forge, with mechanical fan, all driven by electric motors. The *Balari* has been constructed under the direction of Mr. J. Angus, M.Inst.C.E., engineer and London agent to the Calcutta Port Commissioners, assisted by Mr. Robert Anderson, Renfrew, resident inspector.

Cavallo.—On June 3rd, Messrs. Dunlop, Bremner & Co., Port Glasgow, launched the single-screw steamer *Cavallo*, which they have built for the Wilson Line's general cargo trade. The vessel is 310 feet in length, 44 feet 6 inches in breadth, 29 feet 3 inches in depth, and of about 2,100 tons gross. She will be engined by the builders' triple-expansion engines, having cylinders 22½ inch, 38 inch, and 62 inch, in diameter respectively, and a stroke of 42 inch, supplied by steam from two large single-ended boilers.

Ducegi.—On June 9th, The Greenock and Grangemouth Dockyard Company, Greenock, launched the steel screw cargo steamer *Ducegi*, which they have built to the order of the Serviciul Maritim Roman (the Roumanian State Railways). The vessel is a duplicate of the *Carpati*, which was launched

in February from the same yard. The principal dimensions of the vessel are—Length, 300 ft.; breadth 52 ft. 3in.; depth 28 feet; and deadweight carrying capacity, 7,150 tons on a draught of 23 ft.

Alaunia.—On June 10th, Scotts' Shipbuilding and Engineering Company, Greenock, launched the twin-screw Cunard steamer *Alaunia*, which they were prevented by the high wind from launching on June 7th. The *Alaunia* is the second of three vessels which the firm are constructing for the Cunard Company, and is in every respect a duplicate of the *Andania*, which is at present being completed at their works. Both vessels are intended for their owners' Canadian service. They have been built to Lloyd's highest class and are of the shelter deck type, with long bridge, promenade, and boat decks above. Each has nine decks, and the flying bridge is over 50 ft. from the water when the vessel is loaded. Each is over 13,000 tons gross, 540 ft. in length, 64 ft. in breadth, and 46 ft. in depth. Accommodation will be provided for 2,140 passengers—520 cabin and 1,620 third class, and there will be life-saving appliances designed to meet the new requirements of the Board of Trade, with boat accommodation for everyone on board when all the berths are occupied. Although primarily intended for the passenger service, arrangements are made for the stowing and handling of large general and refrigerated cargoes. Engines and boilers have been constructed to the Board of Trade and Lloyd's requirements, and also to pass the American survey, for a working pressure of 210 lb. The machinery consists of twin sets of quadruple-expansion engines, arranged with four cranks balanced on the Yarrow-Schlick-Tweedy system, and developing a total of 8,000 i.h.p.

Emperor Peter The Great.—On June 11th, Messrs. John Brown & Company (Limited), Clydebank, launched the twin-screw steamer *Emperor Peter the Great* which they have built to the order of the Russian Steam Navigation and Trading Company, Odessa, a company established in Russia in the year 1857. The vessel is the first of four similar ships which are at present under construction on the Clyde for the same owners—two at Clydebank and two in Messrs. Denny's yard at Dumbarton. The vessels are designed to develop the trade between the Black Sea ports and Alexandria, and they have been constructed to the highest requirements of Lloyd's Register. Their principal dimensions are:—Length between perpendiculars, 380 ft.; breadth, 51 ft. 6 in.; depth to shade deck, 38 ft. 6 in.; and tonnage, 5,750 tons gross. The passenger accommodation is of an exceptionally fine description in first, second, and third class. Eighty-two first class passengers will be accommodated in one, two, and three berth cabins amidships on the shade and upper decks, all the rooms being naturally lighted and well ventilated. The second class passengers, to the number of 54, are berthed on the upper deck aft in two and four berth cabins, and they have in addition to the large saloon on the upper deck, a ladies' room and a commodious smoke-room on the shade deck. On the main deck forward accommodation will be provided for 300 third class passengers. In the matter of boats and life-saving appliances the latest suggestions of the Board of Trade have been considered, and provision is made for the safety of each person on board. Care has been taken to secure the maximum stowage of cargo compatible with economy of form, and the rapid loading and discharge of commodities will be carried out by eight powerful winches situated on the shade deck adjacent to the cargo hatches. The ship will be propelled by twin-screw, direct-acting, surface-condensing, triple-expansion engines, having six cylinders in all—two high pressure, two intermediate, and two low pressure, of 28 in., 36 in., and 58 in. diameter respectively, and 48 in. stroke. Steam will be supplied by four cylindrical single-ended boilers working at 180 lb. pressure. The vessel was to have been launched on June 7th, but owing to the high wind the launch had to be postponed.

Vicruvia.—On June 12th, Messrs. Russell & Co., Port Glasgow, launched the oil-carrying steamer *Vicruvia*, which they have built for Messrs. Gow, Harrison & Co., Glasgow. The principal dimensions of the vessel are:—Length, 375 ft.; breadth, 51 ft.; depth, 29 ft. 2 in.; and measurement about 4,800 tons gross. The *Vicruvia* is being built to the highest class in Lloyd's and the Bureau Veritas for oil-carrying purposes, and she has a complete outfit of oil pumps and piping. Messrs. Rankin & Blackmore, Greenock, will supply the machinery. During construction the vessel has been superintended by Captain Croker in the hull department and Mr. Charles Eddington for the engines.

Neptuno.—Messrs. William Chalmers & Co., Ltd., of Ruthergien, have launched the steel screw tug *Neptuno*, which they have built for South American owners. Machinery of 110 indicated horse-power will be supplied by Messrs. Fishers, Ltd., Paisley.

Cairnside.—Messrs. Alex. Hall & Co., Aberdeen, recently launched a cargo steamer which they have built to the order of the Wear Steam Shipping Company, Sunderland. The vessel, which was named *Cairnside*, is of the following dimensions:—Length, 165 ft.; breadth, 26 ft.; depth, 12 ft. 6 in. Triple-expansion engines of 750 i.h.p. will be supplied by the builders.

Lodewyk van Nassau.—Messrs. William Hamilton & Co., Port Glasgow, launched recently a passenger and cargo steamer which they built to the order of the Royal Dutch West Indian Mail Company, Amsterdam. The principal dimensions of the vessel are:—Length, 361 feet; beam, 44 feet; and depth to awning deck, 28 feet 5 inches. The steamer, which is intended for the West Indian trade, is rigged as a fore and aft schooner, and has twin masts. The machinery, supplied by Messrs. David Rowan & Co., Glasgow, will consist of triple-expansion engines, having cylinders 25 inches, 41½ and 68 inches in diameter respectively, and a stroke of 51 inches; three single-ended boilers, 15 feet in diameter by 11 feet 6 inches in length, designed for a working pressure of 180 lbs., and fitted with forced draught. The vessel has been built on the Isherwood system of longitudinal framing to Lloyd's highest class, special survey, under the superintendence of Mr. W. Fenenga, of Amsterdam, and of Captain Van der Borden, while the machinery has been constructed under the supervision of Mr. Pals.

LAUNCH—Irish.

Eumaeus.—On June 3rd, Messrs. Workman, Clark & Co., Ltd., Belfast, launched from their South Yard the new steamer *Eumaeus*, built by them for the Ocean Steamship Company Limited, Liverpool (Messrs. Alfred Holt & Co.). The *Eumaeus* is 457 feet in length, with a gross tonnage of about 6,700 and has been constructed on the Owners' girder system which ensures increased strength as well as unobstructed cargo space in the holds, and thus permits of the stowage of the largest class of consignments. The vessel has four large holds and two smaller compartments which are arranged for use either as cargo holds or as water ballast tanks. Accommodation is provided for a number of saloon passengers, also steerage passengers in the forecastle and natives in the 'tween decks. Particular attention has been given to the ventilation of the passenger accommodation, and an efficient installation of heating is provided.

The propelling machinery consists of a set of triple-expansion engines with the necessary auxiliaries supplied with steam from two double-ended boilers working under forced draught, with an auxiliary single-ended boiler for the deck machinery.

TRIAL TRIPS.

Clan Macbeth.—On May 21st, the official trial of the steamer *Clan Macbeth*, a steel screw cargo steamer of the most up-to-date type, built on the Wear to the order of the Clan Line, Ltd., was successfully carried out. The vessel, which is of steel throughout and constructed on the Isherwood system, takes Lloyd's highest class and is of the following dimensions—Length, 385 ft.; breadth, 51ft. 7in.; and depth, 29ft. 11in. The vessel is steam heated and fitted with electric light throughout. The propelling machinery consists of a set of triple-expansion engines with cylinders 25½, 42 and 70in. by 48in. stroke, steam being supplied by three large boilers. The trial trip was most successful, the mean speed obtained during a series of runs on the measured mile being 13 knots; everything worked in a highly satisfactory manner.

Clandeboye.—The new steamer *Clandeboye*, built by Messrs. Scott & Sons, Bowling, for Messrs. John Kelly (Limited), Belfast, ran trials recently on the mile at Skelmorlie, with very satisfactory results. The machinery, which was supplied and fitted on board by Messrs. Aitchison, Blair (Limited), Clydebank, worked very smoothly, and the vessel, being loaded, proceeded to Belfast on the completion of the trials. The hull and machinery were built under the superintendence of Messrs. John H. MacIlwaine & Son, Belfast.

Victorian Transport.—On May 21st, the steel screw steamer *Victorian Transport*, which has been built by the Northumberland Shipbuilding Company, Ltd., to the order of Messrs. Furness, Withy & Co., Ltd., for the Empire Transport Co., Ltd., London, left the Tyne for her official trial trip. The vessel carries over 8,000 tons on a light draught and steams about 10 knots loaded at sea. The trial trip proved in every way satisfactory and a speed of 12 knots was obtained. For Launch see April issue.

Harlow.—On May 22nd, the s.s. *Harlow*, a large shelter deck vessel, built by Messrs. Wm. Doxford & Sons, Ltd., Sunderland, to the order of Messrs. J. & C. Harrison, Ltd., London, ran a successful sea trial, when a speed of 14¼ knots was obtained. For Launch see April issue.

Oosterdyk.—On May 23rd, the steel screw steamer *Oosterdyk* proceeded on her official trial trip in Hartlepool Bay. The *Oosterdyk* is the first of two very fine vessels which Messrs. Irvine's Shipbuilding & Dry Docks Co., Ltd., are building for the Holland-America Line of Rotterdam. The dimensions are 470ft. by 55ft. by 41ft. 7½in. depth moulded to the shelter deck and complete main, upper and shelter decks are fitted with a tier of strong beams at the lower deck height, and steel grain divisions all fore and aft. She is built to Lloyd's highest class, having bulb angle frames and a cellular double bottom is fitted all fore and aft for water ballast, together with a deep tank at each end of the engine and boiler space. Throughout the trial the engines and all auxiliaries worked splendidly, a speed of 15 knots being attained. For Launch see April issue.

Pensilva.—On May 24th, the handsome steel screw steamer *Pensilva*, built by Messrs. Wm. Gray & Co., Ltd., West Hartlepool, for Mr. Richard B. Chellew, of Truro, had her trial trip. The owner was represented by Mr. John Chellew and Mr. Richard Rapson, under whose superintendence the ship and her machinery have been built; Mr. James Innes, surveyor to Lloyd's Registry, was also on board. The performance of ship and machinery gave entire satisfaction to all concerned, the average speed obtained being 13 knots. For Launch see April issue.

Elele.—On May 31st, the steel screw steamer *Elele* proceeded on her official trial trip. This handsome vessel is the second of two built by Messrs. Irvine's Shipbuilding & Dry Docks Co., Ltd., for Messrs. Elder Dempster & Co. of London and Liverpool, being intended for trading on the West African Coast. The dimensions are, length, 420ft., beam, 54ft., depth, 26ft. 3in., with complete main, upper and shelter decks and poop bridge and forecastle above the shelter deck. She is classed Lloyds 100A1, and is built with channel frames and channel beams, which, with a combination of wide-spaced hold pillars and girders gives clear holds and a maximum of capacity. Cellular double bottom is fitted all fore and aft, having a centre watertight division, with fore and aft peaks for water ballast. Throughout the trial the engines and all auxiliaries worked admirably, the owners' representatives expressing entire satisfaction, and on the Whitley Bay measured mile a speed of 13 knots was attained. For Launch see January issue.

Hermion.—On June 2nd, the s.s. *Hermion*, built and engined by Messrs. Wm. Doxford & Sons, Ltd., Pallion, Sunderland, to the order of Messrs. Bruusgraad, Kiösterud & Co., Drammen, ran a successful sea trial, when a speed of 11 knots was attained. For Launch see May issue.

Charles le Borgne.—On June 4th, Messrs. Osbourne, Graham and Co. sent to sea for her official trial, the steel screw steamer *Charles le Borgne*, which they have specially constructed to the order of the Société Fécampoise de Navigation, Fécamp (André Taurin, managing director). Engines have been supplied by Messrs. MacColl & Pollock, Sunderland, having cylinders 17in., 28in. and 46in. by 33in. stroke with two large boilers, and during the trial the vessel, fully loaded, greatly exceeded the contract speed of 10 knots. The vessel proceeded direct to Dieppe to discharge her first cargo. For Launch see June issue.

Sevilla.—On June 4th, the fine new steel screw steamer *Sevilla*, built by Messrs. Wood, Skinner & Co., Ltd., Bill Quay-on-Tyne, to the order of Mr. Otto Thoresen of Christiania, left the Tyne for her official trial trip. On the run over the measured mile the engines worked very smoothly and efficiently, a mean speed of over 11 knots being maintained which gave every satisfaction to all concerned. Amongst those present on the run were Mr. J. Skinner and Mr. L. Skinner, representing the shipbuilders and Mr. J. Daglish representing the engine builders. For Launch see June issue.

Garron Head.—On June 7th, the s.s. *Garron Head* proceeded on her official trial trip in Hartlepool Bay. The trials in every way were entirely satisfactory, a speed of 10·6 knots being attained fully loaded, the vessel afterwards proceeding on her voyage to the Baltic. For Launch see June issue.

Kamo.—The s.s. *Kamo*, built by the Campbeltown Shipbuilding Co., Campbeltown, to the order of the Union Steamship Co. of New Zealand, Ltd., has just completed very satisfactory trials on the Clyde. The *Kamo* has been built to Lloyd's Classification, is of the well-decked type with raised quarter deck, bridge and topgallant forecastle and about 1,300 tons gross measurement. The machinery has been supplied by Messrs. Rankin & Blackmore, Greenock, and consists of triple-expansion engines supplied with steam from two large cylindrical boilers working at a pressure of 180 lbs. under Howden's forced draught. A very full specification and deck and engine room auxiliary machinery for the owners' special requirements has been supplied.

Tasmanian Transport.—On June 12th, the steel screw steamer *Tasmanian Transport*, which has been built by the Northumberland Shipbuilding Co., Ltd., to the order of Messrs. Furness, Withy & Co., Ltd., for the Empire Transport Co., Ltd., London, left the Tyne for her official trial trip. The trial trip proved in every way satisfactory and a speed of 12 knots was obtained. For Launch see May issue.

Ridley.—On June 12th, the steel screw cargo steamer *Ridley*, recently launched by the Blyth Shipbuilding and Dry Docks Co., Ltd., was taken to sea for loaded trial. The performance of both ship and machinery during the several trial runs gave every satisfaction to all concerned. For Launch see June issue.

San Ricardo.—The *San Ricardo*, the first of the Eagle Oil Transport Company's steamers, built by Messrs. Armstrong, Whitworth & Company, was recently taken for trial trip, and completed all her tests to the entire satisfaction of those concerned. She is a tank steamer, 432ft. by 54ft. 6in., and carries a total deadweight of about 9,400 tons on a draught of about 25ft. 11in. She is fitted with quadruple-expansion engines by the Wallsend Slipway & Engineering Company. The cylinders are 24in. by 35in. by 50½in. by 73in by 51in stroke, steam being supplied from three cylindrical multi-tubular boilers 15ft. 6in. by 11ft. 9in., long with a working pressure of 120 lbs. The vessel is one of the most complete tank steamers which has yet been produced, inasmuch as she is fitted for carrying oils of various densities, and special pumping arrangements have been made, so that the vessel can be satisfactorily trimmed, and the full deadweight carried so long as the density of the cargo does not vary beyond the limits which are recognised in the bulk oil trade. The tanks are specially provided with steam-heating apparatus by which the temperature of promiscuous oils can be kept at a point which will ensure sufficient fluidity. The propelling machinery worked to the entire satisfaction of the owners and their resentatives and a mean speed on trial of 11¾ knots was easily maintained.

Sagoland.—On June 12th, the steamer *Sagoland*, built and engined by Messrs. Earle's Shipbuilding & Engineering Co., Ltd., Hull, for the Angfartygs Aktiebolaget Tirfing, Goteburg (Messrs. Axel Brostrom & Son, managers), made her official trial trip in the Humber. During the six hours' trial the engines worked very smoothly, giving the greatest satisfaction, and a speed of 12 knots was maintained. The vessel proceeded to Narvik under the command of Captain J. J. Nilsson. For Launch see June issue.

Acadia.—On June 13th, satisfactory trials were run of the steamer *Acadia*, which has been built and engined by Messrs. Swan, Hunter & Wigham Richardson, Ltd., at their Neptune Works, Newcastle-on-Tyne, to the order of the Canadian Government. On the trial trip everything worked with the greatest satisfaction and a mean speed of over 12½ knots was attained. For Launch see June issue.

BOARD OF TRADE EXAMINATIONS.

MAY 29th, 1913.—LONDON.—*1st Class:* J. Brown, C. Farthing, L. Holthusen. *2nd Class:* E. Cooper, T. Hindes.
BRISTOL.—*2nd Class:* J. Luke, R. Woodward.
LONDONDERRY.—*2nd Class:* S. Titterington.

GREENOCK.—*1st Class:* A. Anderson. *2nd Class:* N. Green, A. McCreadie, A. Waugh, J. Wilson.
ABERDEEN.—*1st Class:* S. Jamieson. *2nd Class:* E. Ritchie.
SUNDERLAND.—*2nd Class:* C. Potts.
LIVERPOOL.—*1st Class:* H. Bilson, T. Lang, J. Shirley. *2nd Class:* T. Bell, W. Cassidy, J. Liversage, F. Wilson.
NORTH SHIELDS.—*1st Class:* T. Bennett, D. Havard, E. Hodgson, T. Suddes. *2nd Class:* J. Addison, T. Craig, J. Fawcett, W. Graham.
HULL.—*2nd Class:* H. Clarke, C. Mathieson, H. Stavey, J. Storey.

JUNE 5th, 1913.—LONDON.—*1st Class:* W. MacLeod, M. Montgomery, W. Nimmo. *2nd Class:* J. Finneey, J. Hooker, J. Rutledge.
BELFAST.—*1st Class:* H. Carlisle, J. Cresswell, J. McKersie, C. Todd. *2nd Class:* J. Stewart.
FALMOUTH.—*1st Class:* E. Prettyman.
LEITH.—*1st Class:* J. Harley, M. Robb. *2nd Class:* J. Brow, J. Fyfe, W. Pipty.
NORTH SHIELDS.—*1st Class:* H. Craine, A. Markham, T. Mitchell, S. Moses, D. Robson. *2nd Class:* W. Davison, W. Jaques, H. Shenton.
LIVERPOOL.—*1st Class:* R. Brown, E. Jones, W. Smith. *2nd Class:* J. Adshead, W. Johnstone, W. Murley, J. Seddon.
SOUTHAMPTON.—*2nd Class:* F. Mattocks, A. Wilson.
CARDIFF.—*1st Class:* E. Care, B. Spence. *2nd Class:* H. Bement, B. Frost.
GLASGOW.—*1st Class:* W. Dinnen, J. Ireland, L. McFarlane, H. Rae, A. Shearer, J. Turner. *2nd Class:* M. Farrow, D. Fernie, J. Harding, W. McKinnon, J. Stark, J. Yule.

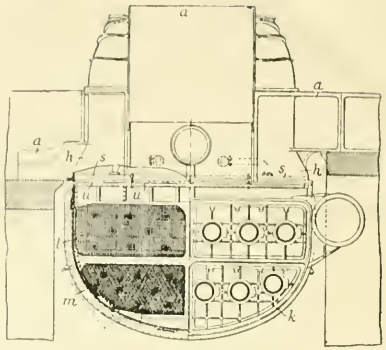
JUNE 12th, 1913.—LONDON.—*1st Class:* L. Douglas, E. King, A. McKenzie, S. Saybolt. *2nd Class:* J. Cooper, J. Cowley.
GREENOCK.—*1st Class:* D. Taylor. *2nd Class:* P. Fyfe, W. Inglis, W. Kennedy, C. Lamont, E. Little, D. McKinnon, J. Patterson, J. Russell, N. Smith, A. Thomson.
DUNDEE.—*1st Class:* J. Black, J. Henry.
LIVERPOOL.—*1st Class:* N. Blaney, R. Fabian, H. Taylor. *2nd Class:* J. Bradley, E. Cail, W. Halsall, A. Meldrum, O. Murphy, J. Nickson, A. Nisbet, C. Tewkesbury.
NORTH SHIELDS.—*1st Class:* W. Cowens, T. Malcolm, N. Ramsay, R. Telford. *2nd Class:* W. Brooks, J. Coffer, F. Coldwell, G. Davidson, W. Hind, J. Oakley.

JUNE 19th, 1913.—LONDON.—*1st Class:* J. Gentle, S. Signal, W. Snook. *2nd Class:* L. Ferguson, J. Hall, A. Swan.
WEST HARTLEPOOL.—*1st Class:* G. McIntosh, T. Platts, H. Sntherst, S. Ward, J. Wilson. *2nd Class:* S. Black, J. Brown, E. Carroll, W. Turner.
LEITH.—*1st Class:* A. Ferguson, A. Newlands, D. Sandilands. *2nd Class:* W. Jolly, G. Philips, L. Slater.
PLYMOUTH.—*1st Class:* H. Peters.
CARDIFF.—*1st Class:* F. Cullen, G. Linton, J. Service, A. Smith. *2nd Class:* P. Becker, C. Littleton, F. Marsh, P. Parkes.
LIVERPOOL.—*1st Class:* R. Freeman, D. Moir, J. Rodgers. *2nd Class:* J. Ball, E. Deakin, S. Edwards, R. Lyttle, F. Morris, R. Neale, J. Richardson.
GLASGOW.—*1st Class:* J. Dunsmuir, P. McLintock, H. Scougall, J. Smith, R. Souter. *2nd Class:* R. Giles, R. MacFarlane.
NORTH SHIELDS.—*1st Class:* A. Donkin, J. Jackson, J. Kendall, R. Oates, W. Smith. *2nd Class:* E. Clarke, G. Gilpin, G. Hope, G. Rossiter, J. Tosse.
SOUTHAMPTON.—*1st Class:* H. Hill. *2nd Class:* H. Davis, H. Hall, K. Prole.

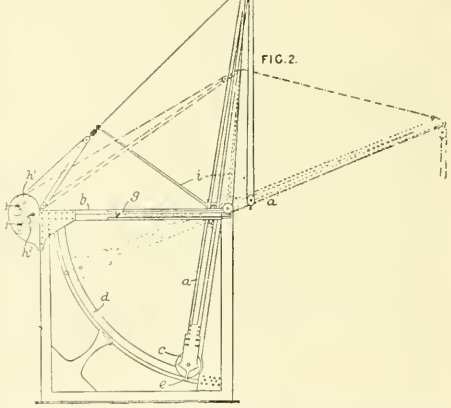
Abridgments of New Patents.

Compiled by Messrs. E. P. Alexander & Son, Chartered Patent Agents, 306, High Holborn, London, W.C.

2130. Turbines.—A condenser *k*, situated below a turbine *a*, is directly attached to the casing of the latter, instead of being mounted upon a foundation. The exhaust steam passes successively through nests of tubes *l*, *m*. Feed-water may be heated by being passed through a pipe *s* and tubes *u* situated between the exhaust pipe *h* of the turbine and the condenser *k*,

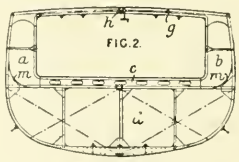


2388. Davits. The davits which move in an athwartship plane comprise jibs *a* working in a horizontal slot arranged in the girder frame *b*. The end of the jib carries a wheel *c* which runs on a quadrant track *d* secured to the frame. Grips *e* embracing the track secure the jib in all positions. The jib and its attached boat tend to move out-



board, and this movement is controlled by the davit tackle which runs from a drum $h1$ over a stanchion *i* secured to the jib head. The boat tackle runs from a drum $h2$ over a pulley on the end of sliding bars *g* to the jib head. Should the ship take a list in the opposite direction, the jibs *a* are forced out-board by pushing out the slide bars *g*, and thus tightening up the boat tackle.

3405. Ships.—Comprises the adaptation of a known form of anti-rolling tanks to destroyer craft in which liquid fuel is carried. The ordinary oil-tanks *a*, *b* of each side of the vessel are connected together at the bottom by a transverse



passage *c* and at the top by a passage *g* fitted with a valve *h*. Each tank contains a curved guide-plate *m* to direct the liquid. In times of war, the liquid fuel would be carried in the tank *d* and the tank *a*, *b* would be partly filled with water.

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